Department Of Labor and Industry (DLI)
Division of Voluntary Apprenticeship

Student Manual

Youth Apprenticeship Health Training Program

Contents

- Occupational Health Safety
- Industrial Hygiene
- Environmental Factors
- First Aid
- CPR

This material is available to you in different forms — large print, Braille or audiotape — if you call (651) 284-5090 (general information) or TTY (651) 297-4198 and request the service.

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Manual Overview

Your health is important to us! We don't want you to get sick or injured at work. That's why we have created this basic health safety information. We want you to understand how to stay healthy. This helps prevent you from getting ill or hurt when you do your job.

There are five Lessons in this Workbook. You can be asked to do the assignments on your own, or you can be guided through the lessons with an Instructor. **Either way, you win**. Its better to know the kinds of health issues and the proper way to keep healthy before you do something that might get you sick.

Prevention starts with understanding occupational health safety, personal and industrial hygiene, and knowing your work environment. That's what **Lessons 1 through 3** talk about.

We understand that the use of personal protective equipment (PPE), machine guarding, walking and work surfaces, materials handling and hazards communications help protect you from injuries. But, if you get hurt, you need to **know what to do**. That's why **Lessons 4 and 5** talk about basic first aid and CPR.

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Instructions

As you step through each of the lessons, you will be asked some beginning questions, called a Pre-Quiz. They are included to help you understand the kind of information that is included in the lesson, and to find out how much you already know about the topic.

At the end of each lesson there is a lesson test. You must complete the test and turn it in to your teacher or supervisor. They will grade your test and share your score with you.

Lesson
1

1. Occupational Health Safety

Introduction

More than 90 million Americans spend their days on the job. They are our most valuable national resource.

Confined spaces are just one type of health and safety problem. They come in all shapes and sizes. It is not always easy to tell if workers are in danger. This, in itself, is dangerous since death can occur in a matter of moments after entering an unsafe confined space. Below are two examples, from the files of Minnesota OSHA, of deaths which occurred after workers entered confined spaces.

File 1: Hydrogen Sulfide Poisoning

A worker entered a manure collection pit after the manure pump was found to be malfunctioning. The pit was 12 feet deep, 4 feet in diameter, and cylindrical. The worker tried to attach a rope to the pump so it could be hoisted up for repair but was rendered unconscious before the rope could be fastened.

One of the farm owners descended into the pit to rescue the worker with only a rope in his hand. Before he could completely loop the rope around the first worker, the owner was also overcome and collapsed.

Both men were dead on arrival at the hospital, the result of hydrogen sulfide poisoning.

File 2: Excessive Exposure To Freon 113

A company had a sump pit which measured 3 x 4 feet with a depth of 4 feet, 8 inches.

Because the pit was shallow, the company did not consider this to be a confined space. A worker drained the pit and then entered it to clean out accumulated sludge. Ten minutes later, the worker was found sitting unconscious in the bottom of the pit. He died about an hour later from excessive exposure to Freon 113.

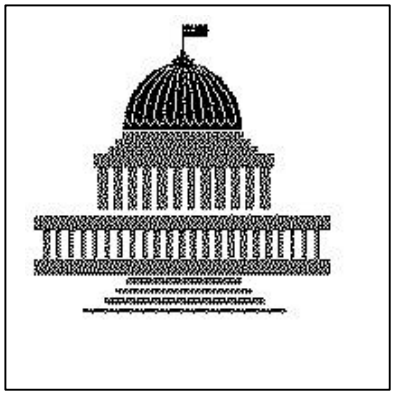
In this case a small amount of ventilation would have prevented this death, as Freon 113 is not very toxic. This demonstrates the need to treat all pits as confined spaces and the importance of finding out all chemicals that could possibly end up in a pit. Only two fluid ounces of this solvent in a pit this size would be enough to cause a problem.

The Occupational Safety and Health Act of 1970

In 1970, Congress evaluated annual safety figures and found that:

- Job related accidents accounted for more than 14,000 worker deaths.
- Nearly 2 ½ million workers were disabled
- Ten times as many person-days were lost from job-related disabilities as from strikes
- Estimated new cases of occupational diseases totaled 300,000.

That was 30 years ago. Since then, these figures have changed with increased population. But, because of lost production and wages, medical expenses and disability compensation, the Occupational Safety and Health Act of 1970 was passed by Congress "… to assure so far as possible every working man and woman in the Nation safe and healthful working conditions and to preserve our human resources."



Under the Act, the Occupational Safety and Health Administration (OSHA) was created within the Department of Labor. Its mission is to:

- Encourage employers and employees to reduce workplace hazards and to implement new or improve existing safety and health programs;
- Provide for research in occupational safety and health to develop innovative ways of dealing with occupational safety and health problems;
- Establish separate but dependent responsibilities and rights for employers and employees for the achievement of better safety and health conditions;
- Maintain a reporting and record keeping system to monitor job-related injuries and illnesses;
- Establish training programs to increase the number and competence of occupational safety and health personnel;
- Develop mandatory job safety and health standards and enforce them effectively; and
- Provide for the development, analysis, evaluation and approval of state occupational safety and health programs.

Before the Act became effective, no central method existed for monitoring occupational safety and health problems. Statistics on job injuries and illnesses were collected by some states and by some private organizations. National projections were not reliable. With OSHA, we have consistent, nation-wide procedures.

Employers of 11 or more employees must maintain records of occupational injuries and illnesses. The purpose of keeping records are to permit survey material to be compiled, to help define high hazard industries, and to inform employees of the status of their employer's record.

If an on-the-job accident occurs that results in the death of an employee or in the hospitalization of three or more employees, all employers must report the accident in detail to OSHA.

Record keeping forms are maintained on a calendar year basis. They are not sent to OSHA. They must be maintained for five years by the employer and must be available for inspection by OSHA.

Employers are responsible for keeping employees informed about OSHA and about the various safety and health matters that they are involved with.

All employees have the right to examine any records kept by their employers regarding their exposure to hazardous materials, or the results of medical surveillance.

A system to prioritize health hazards has been created by OSHA. It includes:

- **Imminent danger** situations are given top priority. This is any condition where there is reasonable certainty that a danger exists that can be expected to cause death or serious physical harm immediately.

- **Serious physical harm** is a condition that could cause permanent or prolonged damage to the body, or could cause temporary disability requiring in-patient hospital treatment. For example, a part of the body is crushed or severed; an arm, leg or finger is amputated; or sight in one or both eyes is lost.

- **Temporary disability** requiring in-patient hospital treatment includes injuries such as simple fractures, concussions, burns, or wounds involving substantial loss of blood and requiring stitches.

- **Injuries or illnesses** are serious if they don't allow a person to perform normal functions, cause reduces physical or mental efficiency or shorten life.

Health hazards may cause imminent danger situations when they present a serious and immediate threat to life or health. For a health hazard to be an imminent danger, there must be a reasonable expectation (1) that toxic substances such as dangerous fumes, dusts or gases are present, and (2) that exposure to them will cause immediate and irreversible harm to shorten life or cause reduction in physical or mental efficiency.

Purpose

In **Lesson 1** you learn about occupational health safety. This will include standards that apply limitations for noise, radiation and air contaminant exposures, requirements for ventilation, toxic health hazards, environmental controls, record keeping, medical treatment and the locations covered.

Objectives

You learn what to look for, how to prevent health problems, when to seek medical treatment and record keeping as you do your job.

Outcomes

After you complete Lesson 1 you can name potential health hazards. You can bring these problems to your supervisor. You can correct many of the problems yourself to prevent injuries and illness.

Quiz

1. The Occupational Safety And Health Administration Act Of 1970 was created to assure that every employee has…

   A) A job.
   B) A safe and healthy workplace.
   C) Workers Compensation Benefits.
   D) Fair Wages .

2. Which health hazard is NOT a priority according to OSHA?

   A) Imminent danger.
   B) Serious physical harm.
   C) Temporary disability.
   D) Basic first aid.

3. Which kind of agent is NOT harmful to your health:

   A) Physical Agents.
   B) Infectious Agents.
   C) Federal Agents.
   D) Air Contaminants.

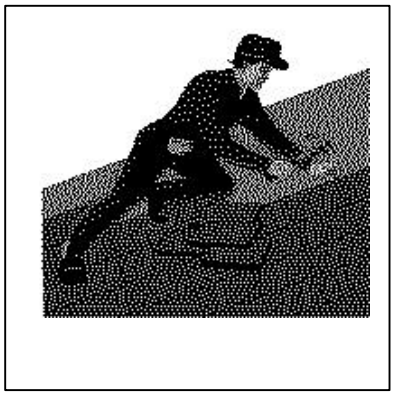
Occupational Health

There are many safety standards to protect you from harm. These include safety hazards that protect all parts of your body including eye, face, head and limbs.

Occupational Health and Safety means protecting your health and your life. The following three examples show how important it is to be aware of your safety and health.

File 3: Fall from Elevation

A crew of two carpenters climbed to the roof of a residential wood frame house to replace the worn out portion of the roof. The employees were preparing to mark a chalk line with employee #2 holding the chalk box while employee #1 was backing up while pulling out the line. Employee #1 backed off the roof edge while #2 was commenting to him about the chalk dust blowing in #2's face.



Employee #1 fell about 21 feet, striking a railing before landing on a concrete slab. He died a short time later from the injuries sustained to is upper body and head. Neither employee appeared to have been trained for this type of work and no fall protection was used. FALLS ARE THE NUMBER ONE CAUSE OF SERIOUS INJURY AND DEATH IN THE WORKPLACE.

File 4: Electrocution

An electrical utility lineman superintendent was repairing wind damage to an insulator (terminator). The lineman was wearing gloves with liners as is routine for this type of work. A small nut fell to the floor of his elevated bucket. He tried to pick up the nut with his gloves on, then removed the gloves to retrieve the nut.

He apparently returned to his work without the gloves. He made contact with an energized phase of 4,160 volts, resulting in a fatality. MOST ELECTRICAL CONTACTS, REGARDLESS OF VOLTAGE, RESULT IN EITHER DEATH OR VERY SERIOUS INJURY. This example shows that even an experienced worker overlooking a routine procedure resulted in death.

File 5: Trench Collapse

The victim of this fatality contracted with a plumbing and heating company to dig a 230 foot long trench for a sewer/water line. An operator was digging this 8 foot deep trench; the victim was assisting by backfilling with a skid loader. The trench was vertical; no sloping, shoring, or other protective system had been used to keep it intact.

The operator noticed that a portion of the trench near the roadway was collapsing. He hear noises but did not know where the victim was at that time. He moved a large chunk of earth with the backhoe and saw the rear of the victim's head. The victim had been buried while standing in an upright position. The operator dug the victim out to chest level. The rescue squad arrived and continued the digging. He was flown to a hospital, but died the next day from sustained injuries. UNSAFE TRENCHES KILL AT LEAST ONE WORKER EVERY YEAR IN MINNESOTA.

Health Related Standards

The Code of Federal Regulations has defined several standards regarding Occupational Safety and Health. Health related standards contain ventilation requirements and limitations for noise and radiation exposures. There are also standards for air contaminants as well as specific standards for certain toxic health hazards such as asbestos, lead, inorganic arsenic, and acrylonitrile.

General environmental controls contain requirements for sanitation, temporary labor camps and “non-water carriage disposal system.”

There is one standard for first aid that only has three paragraphs. The first paragraph requires the ready availability of medical consultation on worker health. The second paragraph requires first-aid trained personnel when the company is not close to a hospital. The third paragraph requires eye washes and deluge showers to be in the work area where employees might be exposed to injurious corrosive materials.

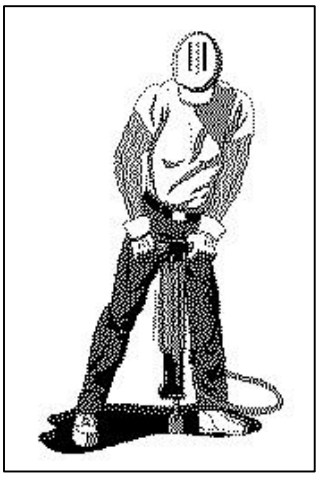
The following topics provide an overview of the occupational health protection issues that you may be exposed to in your work assignments.

Employee Right-to-Know

The Employee Right-to-Know Act was passed by the Minnesota Legislature in 1983. Since then, Federal OSHA has issued its Hazard Communication Standard. The Employee Right-to-Know Act is intended to ensure that employees are aware of the dangers associated with hazardous substances, harmful physical agents, or infectious agents they may be exposed to in their workplaces.

Harmful Physical Agents

Heat. Heat-related health problems result from a combination of internal (body) heat production from doing work and external heat exposure (environment). Heat disorders include heat stroke, heat exhaustion, heat cramps, fainting and heat rash. Employee education is vital so that workers are aware of the need to replace fluids and salt lost through sweat; can recognize dehydration, exhaustion, fainting, heat cramps, salt deficiency, heat exhaustion, and heat stroke as heat disorders; and know the means of protecting themselves.



Noise. Standards require employers to protect all workers from occupational noise exposure that exceeds an 8-hour time-weighted average (TWA) of 90 decibels (dBA). Employers must monitor noise exposure, have control measures, and implement a hearing conservation program when exposure exceed an 8-hour TWA of 85 dBA.

Ionizing Radiation. Some of the most common uses of ionizing radiation occur in hospitals and dental offices with X-ray equipment and radioactive sources for patient treatment and in general industry with non-destructive testing.

Non-ionizing radiation. Possible sources of non-ionizing radiation include lasers used in construction, radio frequency (RF) microwave heaters, and communication systems.

Harmful Infectious Agents

Infectious agents apply to all employers who have employees potentially exposed to them. This means that training must be provided by employers who have a first aid or first responder team, in correctional facilities and group homes, to firefighters and to law enforcement personnel.

The list of infectious agents contains those most common to Minnesota. The list is reviewed by the Department of Health before publication. These infectious agents include bacterial, viral, fungal, parasitic and rickettsial agents.

Bloodborne Pathogens

Bloodborne pathogens are one type of infectious agent. Blood is considered to be human blood, human blood components and products made from human blood. Bloodborne pathogens are pathogenic microorganisms that are present in human blood and can infect and cause disease in humans. These pathogens include hepatitis B virus (HBV) and human immunodeficiency virus (HIV). Contamination of bloodborne pathogens is the presence of blood or other potentially infectious materials on an item or surface. An exposure incident can include a specific eye, mouth, other mucous membrane, non-intact skin, or parental contact with blood or other potentially infectious materials that results from the performance of an employee's duties.

Other potentially infectious materials include the following human body fluids and situations that cause contact with them:

- Semen
- Vaginal secretions
- Cerebrospinal fluid
- Synovial fluid
- Pleural fluid
- Pericardial fluid
- Peritoneal fluid
- Amniotic fluid
- Saliva in dental procedures
- Any body fluid visibly contaminated with blood
- All body fluids in situations where it is difficult or impossible to differentiate between body fluids
- Any unfixed tissue or organ (other than intact skin) from a human (living or dead)

Protective equipment may include gloves, gowns, face shields, eye protection, mouthpieces and resuscitation devices.

On December 6, 1991 the Occupational Safety and Health Administration (OSHA) issued its first standard to protect employees from occupational exposure to biological hazards. The risk of infection with bloodborne pathogens is dependent on the likelihood of exposure to blood and other potentially infectious materials wherever that exposure occurs. Many

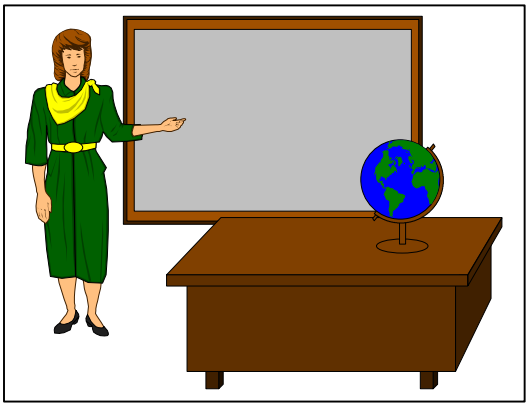
types of occupations deal with pathogens including those in healthcare, non-health care and permanent and temporary work sites.

Examples of healthcare facilities include hospitals; dental and physicians' offices; blood banks and plasma centers; and nursing homes or long term care facilities. Non-healthcare facilities may include the service and repair of medical and dental equipment; infectious waste disposal operations; law enforcement and correctional institutions; and institutions for the developmentally disabled. An example of a mobile (temporary) operation is a scene of trauma or rescue. Other examples include mobile blood banks and crime scenes.

Some employees who may be at risk from occupational exposure to blood include physicians and surgeons, nurses, phlebotomists, medical examiners, dentists and dental workers, dialysis personnel, clinical/diagnostic laboratory workers, medical technologists, nursing home personnel and some laundry and housekeeping employees.

Training

A good employer training program for infectious agents includes topics such as communicable diseases, epidemiology, symptoms of infectious diseases, blood and infectious materials, how an infection is spread through transmission, ways the infection can enter and leave a body, personal protective equipment, decontamination and disposal. Also, immunization practices and vaccines should be covered.



Common Physical And Health Hazards

	PHYSICAL HAZARDS		HEALTH HAZARDS		
Material Class	**Flammables Combustibles**	**Compressed Gas**	**Respiratory**	**Irritant**	**Corrosive**
Solvent Based Paint, thinners, strippers	X		X		
Mastics and adhesives, glues	X		X	X	
Pipe Joint Compound, PVC cements	X		X	X	
Sealants	X		X	X	
Cleaning Solvents	X		X		
Soldering fumes, Lead	X		X		
Welding fumes, rod contents, effects of rays	X		X	X	
Oxygen, acetylene, nitrogen	X	X			
Nuisance dust, particulates			X	X	
Silica, abrasives			X		
L P Gas	X	X			
Carbon Monoxide			X		
Portland Cement, mortars, related ingredients				X	X
Lye, hydroxides					X
Muriatic, sulfuric, hydrochloric, acids					X
Motor oils, hydraulic fluids, gasoline	X			x	

Air Contaminants And Permissible Exposure Limits

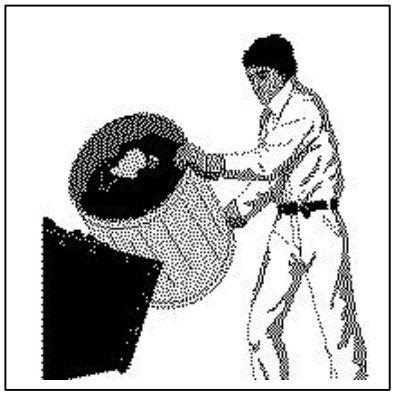
Permissible Exposure Limits (PELs) measure the air particle limits of human exposure. OSHA limits have been established for more that 400 substances. Some of these include grain dust, organic dust, wood dust, carbon dioxide, and chemicals that can be absorbed by the skin.

Environmental Controls

Employers who collect, process or dispose of waste regulated under the Federal Resource Conservation and Recovery Act are exempt from the hazardous substances and harmful physical agents training and information requirements of The Employee Right-to-Know Act. That is because they must have their own training program and submit it to MNOSHA for approval.

These training programs must include machinery hazards, proper lifting techniques, potential for exposure to hazardous materials (i.e. solvents, corrosives, acids, flammables, pressurized containers), how to handle unlabeled containers, emergency procedures, personal protective equipment, traffic hazards and operation of heavy equipment.

This exemption does not include bloodborne pathogens. This kind of training is required for all employees that have the potential for exposure to bloodborne pathogens as a result of their job responsibilities.



Waste service employers include garbage and rubbish collectors, landfill operators, hazardous waste transporters, and independent testing laboratories or government agencies who visit hazardous waste sites.

Record keeping

Employers are required by law to maintain accurate records of, and to make periodic reports on, work-related deaths, injuries and illnesses other than minor injuries and illnesses requiring only first aid treatment and which do not involve medical treatment, loss of consciousness, restriction of work or motion, or transfer to another job.

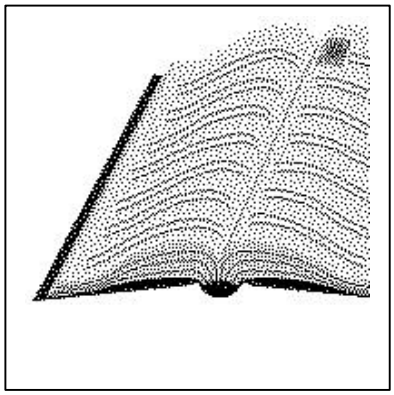
Each case is distinguished by the treatment provided (i.e., if the injury required medical treatment, it is recordable; if only first aid was required, it is not recordable.)

However, medical treatment is only one of several criteria for determining recordability.

Regardless of treatment, if the injury involves loss of consciousness, restriction of work or motion or transfer to another job, the injury is recordable.

Work-related Injury or Illness

An injury or illness is considered work-related if it results from an event or exposure in the work environment.



Fatalities

All work-related fatalities are recordable.

Illnesses

All work-related illnesses are recordable.

Occupational illnesses must be diagnosed to be recordable. However, they do not have to be diagnosed by a physician or other medical personnel. Diagnoses may be by a physician, registered nurse, or a person who by training or experience is capable to make such a determination.

Employers, employees, and others may be able to detect skin diseases or disorders without the benefit of specialized medical training. However, a case more difficult to diagnose, such as silicosis, would require evaluation by properly trained medical personnel.

Injuries with medical treatment

All work-related injuries are recordable if they require medical treatment or involve loss of consciousness, restriction of work or motion, or transfer to another job.

Back injuries

For OSHA record keeping, all back cases are to be recorded as injuries.

Medical Treatment

The following procedures are generally considered medical treatment. Injuries for which this type of treatment was provided or should have been provided are almost always recordable if the injury is work related.

- Infection
- Antiseptics during 2nd or subsequent visit
- Sutures
- Butterfly Adhesive Dressings or Steri strips
- Foreign bodies embedded in eye
- Removal of foreign bodies from wound, if procedure is complicated

- Use of prescription medication, except single dose on 1st visit
- Soaking therapy on 2nd or subsequent visit
- Cutting away dead skin
- Heat therapy during 2nd or subsequent visit
- Positive X-ray diagnosis
- Admission to hospital for treatment

Pre-existing conditions

Injuries – The aggravation of a previous injury almost always results from some new incident. Consequently, when work related, these new incidents should be recorded as new cases.

Illnesses – Certain illnesses, such as silicosis, may have prolonged effects that recur over time. The recurrence of these symptoms should not be recorded as new cases. However, some illnesses, such as certain dermatitis or respiratory conditions may recur as the result of new exposures to sensitizing agents, and should be recorded as new cases.

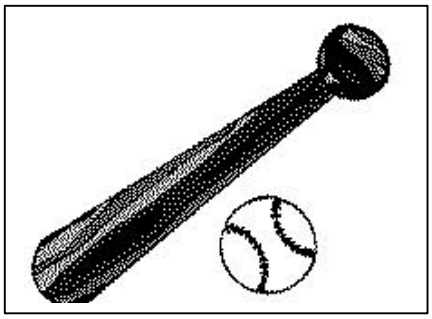
OSHA Locations Coverage

When an employee is off the employer's premises, work relationship must be established; when on the premises, this relationship is presumed.

Ball fields

Company ball fields and recreational facilities are not considered part of the employer's premises. The presumption of work relationship for these activities does not apply.

However, employees engaged in work-related activities at these locations are covered.



Parking Lots

Company parking lots are not considered part of the employer's premises; hence, injuries on these lots are not presumed to be work related.

However, employees engaged in work-related activities on parking lots (such as resurfacing, commencing on a business trip, etc.) are covered.

Travel

Coverage includes only those activities necessary for the business trip. Normal living activities are excluded.

Prescription medications

When a single dose is given for a minor injury, it is not considered medical treatment.

A “single dose” is the measured quantity of the therapeutic agent to be taken at one time.

Work Hours

The figure for hours worked should reflect the actual hours of exposure for all employees during which employers must record injuries and illnesses.

Exceptions:

- Lunch taken in the company cafeteria while employee is “off the clock”; and
- Unpaid breaks taken on the employer’s premises.

Permit-required confined spaces

Many workplaces contain spaces that are considered to be “confined” because their configurations hinder the activities of any employees who must enter into, work in, and exit from them. In many instances, employees who work in confined spaces also face increased risk of exposure to serious physical injury from hazards such as entrapment, engulfment, and hazardous atmospheric conditions. Confinement itself may pose entrapment hazards, and work in confined spaces may keep employees closer to hazards, such as an asphyxiating atmosphere, than they would be otherwise. For example, confinement, limited access, and restricted airflow can result in hazardous conditions that would not arise in an open workplace.

The term “permit-required confined space” refers to those spaces that meet the definition of a “confined space” and pose health or safety hazards, thereby requiring a permit for entry.

A **confined space** has limited or restricted means of entry or exit, is large enough for an employee to enter and perform assigned work, and is not designed for continuous occupancy by the employee. These spaces may include underground vaults, tanks, storage bins, pits and diked areas, vessels and silos.

A **permit-required confined space** is one that meets the definition of a confined space and has one or more of these characteristics: (1) contains or has the potential to contain a hazardous atmosphere, (2) contains a material that has the potential for engulfing an entrant, (3) has an internal configuration that might cause an entrant to be trapped or asphyxiated by inwardly converging walls or by a floor that slopes downward and tapers to a smaller cross section, and/or (4) contains any other recognized serious safety or health hazards.

Summary

In lesson 1 you were introduced to the basics of **occupational health safety**. This included:

- Occupational Health
- Employee Right-to-Know
- Harmful Agents
- Air Contaminants and Permissible Exposure Limits
- Environmental Controls and Record Keeping
- Medical Treatment, Pre-existing Conditions and Locations Covered

A detailed outline of Lesson 1 summarizes each area that you learned as follows:

A) Introduction

1) File 1: Hydrogen Sulfide Poisoning

2) File 2: Excessive Exposure To Freon 113

3) The Occupational Safety & Health Act Of 1970

- Imminent Danger, Serious Physical Harm, Temporary Disability, Injuries and illnesses

B) Purpose

1) Objectives

2) Outcomes

3) Quiz

C) Occupational Health

1) File 3: Fall From Elevation

2) File 4: Electrocution

3) File 5: Trench Collapse

4) Health Related Standards

D) Employee Right-to-Know

E) Harmful Physical Agents

1) Heat

2) Noise

3) Ionizing Radiation

4) Non-ionizing Radiation

F) Harmful Infectious Agents

1) Bloodborne Pathogens

2) Training

G) Common Physical and Health Hazards Chart

H) Air Contaminants and Permissible Exposure Limits

I) Environmental Controls

J) Record Keeping

1) Work Related Injury or Illness

2) Fatalities

3) Illnesses

4) Injuries with Medical Treatment

5) Back Injuries

K) Medical Treatment

L) Pre-Existing Conditions

1) Injuries

2) Illnesses

M) OSHA Locations Coverage

1) Ball Fields

2) Parking Lots

3) Travel

4) Prescription Medications

5) Work Hours

6) Permit-Required Confined Spaces

Lesson 1 Test – Occupational Health Safety

1. **The Occupational Safety and Health Administration (OSHA) was created within the Department of Labor. It has seven areas that it covers in its mission statement. Which of the following is NOT included?**

   a) Encourage employers and employees to reduce workplace hazards and to implement new or improved existing safety and health programs.

   b) Maintain a reporting and record keeping system to monitor job performance.

   c) Establish training programs to increase the number and competence of occupational safety and health personnel.

   d) Develop mandatory job safety and health standards.

2. **The Employee Right-to-Know Act was passed by the Minnesota Legislature in 1983. It is intended to make sure that employees are aware of dangers. Which danger is NOT part of this act?**

   a) Hazardous substances.

   b) Harmful physical agents.

   c) Infectious agents.

   d) Personal Protective Equipment.

3. **Harmful physical agents include heat, noise, ionizing radiation and non-ionizing radiation. Which statement is NOT TRUE?**

   a) Heat-related health problems result from a combination of body heat and heat exposure.

   b) All employers must protect workers from noise levels that exceed air line standards.

   c) Ionizing radiation occurs in hospitals and dental offices with X-ray machines.

   d) Possible sources of non-ionizing radiation include lasers and microwave heaters.

4. **Which of the following is NOT a harmful infectious agent?**

   a) Blood pathogens.

   b) Bacteria.

   c) Saliva.

   d) Parasite.

5. Air Contaminants are measured in PELs. What does this abbreviation stand for?

a) Personal Experience levels.

b) Permissible Exposure Limits.

c) Particle Experimental Limits.

d) Potential Employer Liabilities.

6. Employers who collect, process or dispose of waste regulated under the Federal Resource Conservation and Recovery Act are exempt from hazardous substances and harmful physical agents training. Which of the following is NOT EXEMPT?

a) Bloodborne pathogens.

b) Solvents.

c) Flammables.

d) Corrosives.

7. Employers are required by law to maintain accurate records in injuries and illnesses. Which item below does NOT require record keeping?

a) Work-related deaths.

b) First aid treatment.

c) Loss of consciousness

d) Work-related fatality or illness.

8. Which of the following is NOT considered an OSHA-defined medical treatment?

a) Foreign bodies embedded in eye.

b) Back injury.

c) Prescription medications for allergies.

d) Admission to hospital.

9. When evaluating pre-existing medical conditions associated with previous injuries and illnesses, which one should <u>NOT</u> be recorded as a recurring symptom?

a) Silicosis.

b) Dermatitis.

c) Respiratory.

d) Fractures.

10. Many workplaces contain spaces that are considered to be "confined". Which of the following is a <u>FALSE</u> statement?

a) An area is confined if it hinders the activities of any employee that must enter into, work in, and exit from them.

b) An employee must wear Personal Protective Equipment when entering a confined space.

c) Employees who work in confined spaces face increased risk of exposure to serious physical injury.

d) A confined space has limited means of entry or exit, large enough for an employee to enter, but not designed for occupancy.

Lesson
2

2. Industrial Hygiene

Introduction

An industrial hygienist is trained in engineering, physics, chemistry or biology. They have knowledge and experience about the effects of health, and about chemical and physical agents under various levels of exposure. The industrial hygienist is involved with the monitoring and analytical methods required to detect the extent of exposure, and the engineering and other methods used for hazard control.

The environment, and its relationship to worker health, was recognized many years ago. But, little was done to protect the worker because they were considered expendable. History records as early as 400 B.C. tell us that lead toxic poisoning in the mining industry was recognized and recorded by Hippocrates.

Approximately 500 years later, Pliny the Elder, a Roman scholar, referred to hazards in handling zinc and sulfur. He also designed a protective mask to be used by workers exposed to large amounts of dust or lead fumes. Romans, at that time, were more concerned with engineering and military achievements than in making advances in the field of occupational medicine.

In the second century AD, Galen, a Greek physician in Rome, wrote about anatomy and pathology regarding lead poisoning. He recognized the hazardous exposures of copper miners to acid mists. But, no preventive measures were discussed.

The study of occupational disease was ignored until 1473 when Ulrich Ellenbog published a pamphlet on occupational diseases and injuries with gold miners. He also wrote about toxic carbon monoxide, mercury, lead and nitric acid. This was the beginning of industrial hygiene and preventive measures.

The field of industrial hygiene was advanced by a German scholar, Agricola, in 1556. He talked about ventilation and personal protection for workers, accidents and diseases.

In the sixteenth century, industrial hygiene was thought of as demons that inhabited the mines. It was thought that they could be controlled by fasting and prayer. But, in 1700, industrial hygiene again regained a respected practice when the first book was published in Italy on occupational medicine by the "father of industrial medicine", Bernardino Ramazzini.

Purpose

In **Lesson 2** you learn about industrial hygiene. This includes history highlights of industrial hygiene, its definition, the recognition of health hazards and the control of environmental factors.

Objectives

During this lesson you will learn what an industrial hygienist does. You will learn the meanings of terms, general health and rules associated with specific health hazards.

Details associated with environmental factors will be covered in the next lesson.

Outcomes

After completion of Lesson 2, you can describe what an industrial hygienist does, what industrial hygiene means, the recognition of certain health hazards and the four environmental factors or stresses that can cause sickness, impaired health or significant discomfort.

Quiz

1. In the sixteenth century, industrial hygiene was considered to be?

   A) A demon.
   B) A dirty worker.
   C) A gold miners' disease.
   D) A Roman medical treatment.

2. An industrial hygienist?

   A) Studies electrical engineering.
   B) Evaluates chemical and physical agents.
   C) Monitors radiation exposure records.
   D) Performs medical treatments.

3. What Environmental Factor does NOT belong in this list?

   A) Chemical hazards.
   B) Physical hazards.
   C) Emotional hazards.
   D) Biological hazards.

Definition

Today, emphasis has shifted from correctional to preventive industrial hygiene. Congress has passed three major pieces of legislation:

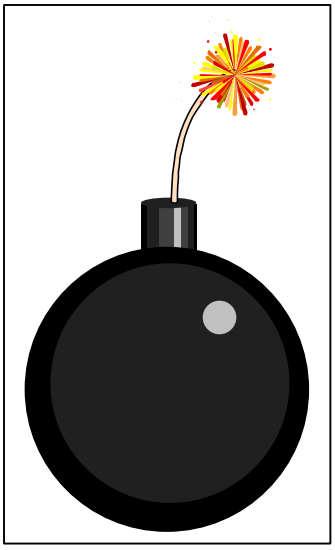
- The Metal and Nonmetallic Mine Safety Act of 1966
- The Federal Coal Mine Safety and Health Act of 1969
- Occupational Safety and Health Act of 1970 (OSHA)

Industrial Hygiene has been defined as "that science or art devoted to the anticipation, recognition, evaluation, and control of those environmental factors or stresses, arising in or from the workplace, which may cause sickness, impaired health and well-being, or significant discomfort and inefficiency among workers or among the citizens of the community."

The federal government is authorized to develop and set mandatory occupational safety and health standards affecting business. The enforcement of these standards have been given to the Department Of Labor.

Recognizing Health Hazards

To better understand the types of hazards that an industrial hygienist recognizes and evaluates, the following extensive set of hazards is being provided.



Combustion. Any process involving combustion should be looked at to determine what byproducts of the combustion may be released to the environment and how high the burner noise may be.

High Temperatures. Any process involving high temperature, with or without combustion, should be questioned as to the possibility of excessive heat on the employees, either as the result of high ambient temperature or of excessive radiant heat.

Induction Heating. Any process involving induction heating, including microwave, should be questioned as to heating effects on the employees and as to noise levels, including ultrasonic effects.

Melting. Any process involving the melting of metal should be studies for toxicity of the metal fume or dust produced.

Electric Discharge. Any process involving an electric discharge in air should be examined for the possibility of production of ozone and oxides of nitrogen. If it is an arc or spark discharge, the effects of radiation from the flame and the products of destruction of

the electrodes should be investigated. Processes of this sort also commonly involve hazards of high potential electrical circuits of low internal resistance.

Grinding. Grinding, crushing or comminuting of any material involves the hazard of dust of the material being treated and of the grinding materials. Wet grinding of any material will have possible hazards of mist, dust and noise. Dry grinding operations, including milling and sandblasting, should be examined for dust and noise hazards. Employees should wear proper hearing protection. There can also be vibration problems. There can be a potential dust problem depending on how long parts have been sitting in an area. If the parts have only been in the area an hour or two and collected a lot of dust, there may be a problem. The composition of the dust should also be investigated. The intense light and flying particles require tinted eye protection and a face shield. The employee should also wear an apron and gloves.

Sifting. Conveying, sifting, sieving, screening or bolting of any dry material presents a dust hazard.

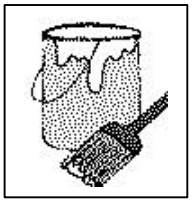
Mixing. Mixing of dry material presents a dust hazard. Mixing of wet materials presents possible hazards of solvent; vapors, mists, possible dust and noise.

Bending. Cold bending, forming, or cutting of metals or nonmetals should be examined for hazards of contact with lubricant, inhalation of lubricant mist and excessive noise. Hot bending, forming or cutting of metals or nonmetals may have the hazards of lubricant mist, decomposition products of the lubricant, contact with the lubricant, heat (including radiant heat), noise and dust.

Small Parts. Handling of small parts present hazards of repeated motion and mechanical shock.

Coating Operations. Coating operations, generally preceded by solvent degreasing can cause a hazard. Electroplating-toxicity of the various metallic salts-acids, and alkalis both by skin contact and by inhalation. Particularly well known are nickel and cobalt as causes of dermatitis, chromium for production of nasal ulcers, and alkaline cleaning baths as irritants to eyes and upper respiratory system. Mechanical coating with metals presents hazards of dust and fumes of metals and fluxes in addition to heat and radiation.

Painting. Painting should be examined for the possibility of hazards from inhalation and contact with toxic and irritating solvent and inhalation of toxic pigments. Ceramic coating presents the same hazards of toxic pigments as paint plus hazards of heat from the furnaces, and from the hot ware.



Explosive. Explosive processing will involve gases from the explosive, largely carbon monoxide and oxides of nitrogen, and dust from the material being processed.

Warehousing. Warehousing should be checked for carbon monoxide and oxides of nitrogen.

Electroplating. Electroplating is the depositing of metal on the surface of an article to provide a more attractive surface finish, corrosion resistance, hard wearing surface, or build up an undersized or worn part. Common electroplating processes include zinc chromium, copper, silver, gold and nickel plating. Articles to be plated must first be pretreated by degreasing, alkaline or emulsion cleaning, etching and pickling. The raw materials used in plating solution baths include acids, alkalies, cyanides, metals, and

degreasing solutions. Mists and vapors are the hazards from these processes and adequate ventilation is a must. Workers should wear protection for skin (gloves, aprons, boots) and eyes (goggles, face shields). It is advisable that workers shower and change clothes at the end of the work day.

Printing operation. In a printing operation where the worker is cleaning off a roller, the solvent can be a health hazard because it can cause dermatitis. The worker should be wearing gloves to prevent skin contact. There should also be adequate ventilation so that he's not exposed to vapors through inhalation. Printing inks contain a variety of components and skin contact should be kept to a minimum.

Battery Plant. In many situations, maintenance people responsible for cleanup operations may be highly exposed to hazardous substances. When employee health and safety is considered, maintenance people are often a neglected segment of the workforce. A worker sweeping dust may contain lead. To minimize his exposure, wet-sweeping or vacuuming would generate less dust. Smoking should not be permitted when sweeping. Any lead that gets on the cigarette may be inhaled or ingested by the worker.

Open Surface Tanks. A respirator should be worn. A working pouring water into an open surface tank could be a problem depending on what material is (or was) in the tank. If there is a splashing hazard, the face shield should be down and the arms covered.

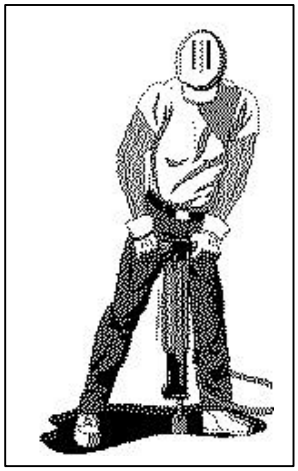
Molten Metal. A worker sampling molten metal could be exposed to a health hazard. Heat, specifically radiant heat, should be reduced by shielding the worker from the molten metal and taking samples through a small opening in the shield. The workers' eyes should be protected from the ultraviolet and visible radiation by tinted lenses. Fumes may also be a problem.

Sand Blasting. Silica dust is a primary hazard. Abrasive-blasting respirator is required. There should be an airline supply to the hood. Noise is another health hazard. Hearing protection is a must during abrasive blasting operations. The high pressure hose used to convey the abrasive material should not be straddled or stepped on.

Fork Lift. Gasoline engines are notorious carbon monoxide producers. While gasoline fueled power lift trucks present the greatest carbon monoxide hazard, it is not generally know that propane or LPG fueled lift trucks also generate potentially hazardous amounts of carbon monoxide. This is especially true when the engines are not properly tuned or are severely worn. If the propane or LPG fueled lift trucks are driven into a truck trailer or boxcar and allowed to run while its driver hand-loads materials onto a pallet, hazardous carbon monoxide concentrations may build up inside the trailer or boxcar.

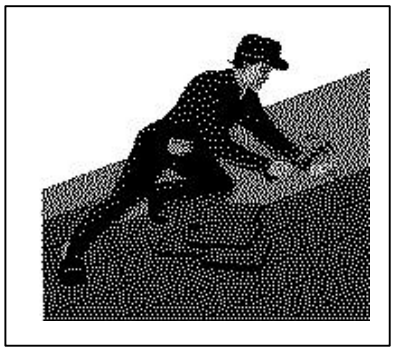
Fiberglass. Fiberglass is used as a reinforcement in the fabrication of a wide range of products from underground storage tanks to hulls for boats. In some processes, strands of fiberglass are fed from rolls into "chopper guns" that simultaneously chop the stands and mix them with the resin. The fiberglass is then sprayed on to form the shape of the product. The most prevalent chemical hazard in this process is from the styrene-based resin. Styrene liquid and vapor are irritating to the eyes, nose, throat and skin. Repeated

skin contact can cause dermatitis. Exposure to high concentrations may cause dizziness and unconsciousness. Chronic effects may include increased reaction time and decreased manual dexterity. Adequate ventilation is a must. Approved respirators may also be necessary. Irritation from dust is a hazard in fabrication facilities where grinding and sanding of fiberglass-reinforced, cured resins is performed. Local ventilation and PPE (respirators, eye protection) should be used. Long sleeved, loose fitting clothing and gloves should be worn. Workers should shower at the end of the work day and change clothes.



Jackhammers. When breaking up concrete with a jackhammer, dust from this operation is primarily nuisance dust, but may contain silica. Inhalation of crystalline silica dust may cause scarring of the lungs with cough and shortness of breath. This is called "silicosis", a form of disabling, progressive and sometimes fatal pulmonary fibrosis. Dust exposure may be reduced through the use of wet methods and respirators. Noise is an obvious problem and hearing protection is a must. A condition known as "dead fingers" or "white fingers" (Raynaud's Phenomenon) can affect the workers using vibrating tools, such as jackhammers. The injury is caused by vibrating the fingers as they grip them in performing their tasks. The circulation in the hands becomes impaired and when exposed to cold the fingers become white and without sensation, as though mildly frostbitten. The white appearance usually disappears when the fingers are warmed for some time, but a few cases are sufficiently disabling that the victims are forced to seek other types of work. Reducing the vibration energy transferred to the fingers through the use of padding helps prevent this problem.

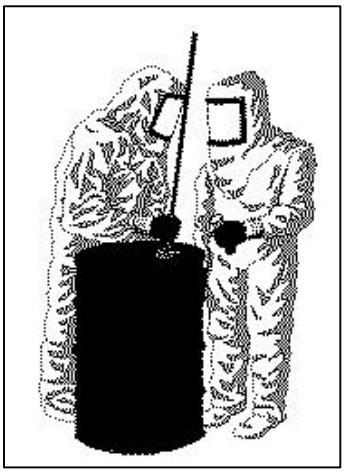
Roofers. Roofing materials contain coal tar pitch volatiles (CTPVs) which can affect the body if they are inhaled or if they come in contact with the eyes or skin. CTPVs are products of the destructive distillation of bituminous coal and contain polynuclear aromatic hydrocarbons (PNAs). Repeated exposure to CTPVs has been associated with an increased risk of developing bronchitis and cancer of the lungs, skin, bladder and kidneys. Pitch vapors that contact the skin can sensitize it to sunlight (cutaneous photosensitization), resulting in sunburns in a very short period of time. In addition, this type of exposure may produce contact dermatitis.



Chemical Storage. When storing materials, care must be taken to avoid placing incompatible substances in close proximity. The most well-known hazard of incompatibility is mixing cyanides and acids to produce hydrogen cyanide gas. Dry sodium cyanide should be placed on a pallet, elevated above ground level. This is a good practice, since it would prevent leaking liquid (acid) from mixing with the dry sodium cyanide. These materials should be separated however to avoid potential problems.

Control of Environmental Factors

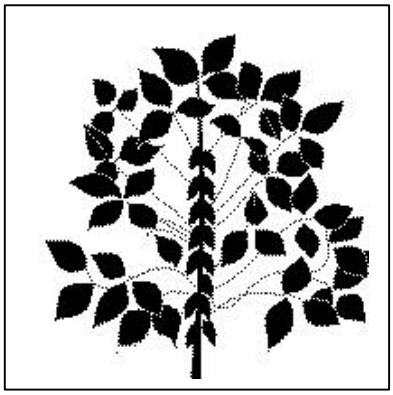
The various environmental factors or stresses that can cause sickness, impaired health, or significant discomfort in workers can be classified as chemical, physical, ergonomic, or biological.



Chemical hazards are from excessive airborne concentrations of mists, vapors, gases, or solids that are in the form of dusts or fumes. In addition to the hazard of inhalation, many of these materials may act as skin irritants or may be toxic by absorption through the skin.

Physical hazard includes excessive levels of electromagnetic and ionizing radiation, noise, vibration, and extremes of temperature and pressure.

Ergonomic hazards include improperly designed tools or work areas. Improper lifting or reaching, poor visual conditions, or repeated motions in an awkward position can result in accidents or illnesses in the occupational environment. Designing the tools and the job to be done to fit the worker should be of prime importance. Intelligent application of engineering and biomechanical principles is required to eliminate hazards of this kind.



Biological hazards include insects, molds, fungi, and bacterial contaminants (sanitation and housekeeping items as potable water, removal of industrial waste and sewage, food handling, and personal cleanliness.) Biological and chemical hazards overlap.

Summary

During this lesson, you learned about industrial hygiene. This included history highlights of industrial hygiene, its definition, the recognition of health hazards and the control of environmental factors.

You also learned what an industrial hygienist does and the meanings of terms, general health and rules associated with specific health hazards, and the four environmental factors or stresses that can cause sickness, impaired health or significant discomfort.

Lesson 2 dealt with industrial hygiene. This included:

- Recognizing Health Hazards

- Control Of Environmental Factors

A detailed outline of Lesson 2 summarizes each area that you learned as follows:

A) Introduction

B) Purpose

1) Objectives

2) Outcomes

3) Quiz

C) Definition

1) Recognizing Health Hazards

- Combustion, High Temperatures, Induction Heating, Melting, Electric Discharge, Grinding, Sifting, Mixing, Bending, Small Parts, Coating Operations, Painting, Explosive, Warehousing, Electroplating, Printing Operations, Battery Plant, Open Surface Tanks, Molten Metal, Sand Blasting, Fork Lift, Fiberglass, Jackhammers, Roofers, Chemical Storage

2) Control Of Environmental Factors

- Chemical, Physical, Ergonomic and Biological Hazards

Lesson 2 Test – Industrial Hygiene

1. The "father of industrial medicine" was:

a) Pliny the Elder, a Roman scholar.

b) Agricola, a German scholar.

c) Bernardino Ramazzini, from Italy.

d) Galen, a Greek physician in Rome.

2. Industrial Hygiene is defined as:

a) That science or art devoted to the anticipation, recognition, evaluation and control of environmental factors in the workplace that cause sickness or impaired health.

b) That science or art devoted to the anticipation, recognition, evaluation and control of hazardous materials in the workplace that cause injury or death to workers.

c) That science or art devoted to medical treatment associated with sickness, impaired health or significant discomfort of workers exposed to airborne contaminants.

d) That science or art devoted to the study of engineering, physics, chemistry and biology

3. Which of the following health hazard statements is <u>FALSE</u>?

a) Any process involving combustion should be looked at to determine what effects the byproducts of combustion may release to the environmental ozone layer.

b) Any process involving high temperature should be questioned for the possibility of excessive heat exposure to the employee.

c) Any process involving induction heating, including microwave, should be questioned as to the heating effects on the employees.

d) Any process involving an electric discharge in air should be examined for the possibility of production of ozone and oxides of nitrogen.

4. An electric discharge is?

a) An arc or spark.

b) Static electricity.

c) Lightning.

d) All of the above.

5. When grinding, which of the following statements is <u>FALSE</u> ?

a) Grinding, crushing or comminuting of any material involves the hazard of dust.

b) Wet grinding will have possible hazards of mist, dust and noise.

c) Dry grinding, including milling and sandblasting, creates dust and noise hazards

d) Dust collected on parts, as the result of grinding, can cause an explosion hazard.

6. Which of the following does <u>NOT</u> present a dust hazard?

a) Sifting, conveying, sieving and screening.

b) Mixing of dry materials.

c) Cold bending, forming or cutting of metals without lubricant.

d) Explosive processing involving gases such as carbon monoxide and nitrogen.

7. Which of the following health hazards requires a worker to take a shower and change clothes after work to protect their skin and eyes?

a) Coating operations that use solvent degreasing.

b) Painting operations that use toxic and irritating solvents.

c) Electroplating, when depositing metal on the surface finish.

d) Sandblasting, when the dust is too thick to breathe.

8. Which operation can cause Raynaud's Phenomenon or "dead fingers"?

a) Printing operators.

b) Fork lift operators.

c) Molten metal operators.

d) Jackhammer operators.

9. Which operation does NOT cause a skin AND breathing health hazard?

a) Working in a battery room.

b) Working with small plumbing parts.

c) Filling an open surface tank.

d) Working with chemical storage.

10. Various environmental factors can cause sickness, impaired health or significant discomfort. Which statement below is <u>FALSE</u>?

a) Chemical hazards are from airborne mists, vapors, gases or solids in the form of dusts or fumes that can effect breathing and skin irritation.

b) Physical hazards include excessive levels of electromagnetic and ionizing radiation, noise, vibration, temperature and pressure.

c) Ergonomic hazards include improper fire escapes, lighting conditions and electric hazards in the occupational environment.

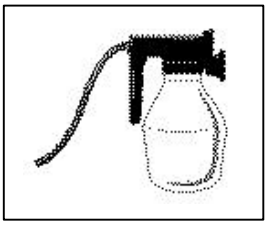
d) Biological hazards include insects, molds, fungi and bacterial contaminants such as industrial waste, sewage, food handling and personal cleanliness.

Lesson
3

3. Environmental Factors

Introduction

It is important that you understand the various environmental factors or stresses that can cause sickness, impaired health, or significant discomfort to you at work. In **Lesson 3** you learn about environmental factors such as chemical hazards, physical hazards, ergonomic hazards and biological hazards. You don't want to be exposed to a hazard, when it can be prevented.



Purpose

Objectives

During **Lesson 3** you will learn what environmental factors are. You will learn the meaning of terms, general health rules and the requirements to protect you from chemical, physical, ergonomic and biological hazards.

Outcomes

After completion of Lesson 3, you can describe what environmental factors are, how to look for them, and how these environmental factors can cause sickness, impaired health or significant discomfort.

Quiz

1. Environmental Factors include:

   A) Loud noises.
   B) Toxic gas.
   C) Tool design.
   D) All of the above.

2. Safety hazards labeling is required by the:

   A) Occupational Health and Safety Administration Act.
   B) Federal Alcohol Administration Act.
   C) Consumer Product Safety Act.
   D) Federal Hazardous Substances Act.

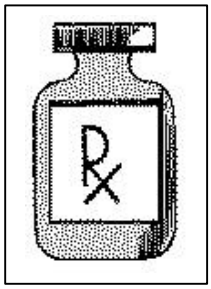
3. Asbestos is:

   A) A chemical hazard.
   B) A physical hazard.
   C) An ergonomic hazard.
   D) A biological hazard.

Safety Hazards Labeling

Material Safety Data Sheets (MSDS) contain information about hazardous materials, drugs and chemicals. In addition, shipping containers are labeled or other markings on each container of hazardous substances includes the identity of the hazardous substance and appropriate hazard warning. The label also includes a coded reference to the appropriate MSDS. Chemical hazards also have special color-coding to identify their risk.

You will find labels for pesticides, foods, food additives, color additives, drugs or cosmetics including materials intended for use as ingredients in these products. Distilled spirits (beverage alcohol), wine or malt beverage labels follow the Federal Alcohol Administration Act.



Consumer products are defined in the Consumer Product Safety Act.

Any hazardous substance is defined in the Federal Hazardous Substances Act.

Chemical Hazards

About 32 million workers are potentially exposed to one or more chemical hazards. There are an estimated 575,000 existing chemical products, and hundreds of new ones being introduced annually.

Chemical exposure may cause or contribute to many serious health effects such as heart ailments, kidney and lung damage, sterility, cancer, burns and rashes.

The majority of the occupational health hazards are from inhaling chemical agents in the form of vapors, gases, dusts, fumes, and mists, or by skin contact with these materials. The degree of risk of handling a given substance depends on the magnitude and duration of exposure.

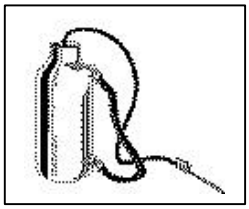
To recognize occupational factors or stresses, a health and safety professional must first know about the chemicals used as raw materials and the nature of the products and by-products manufactured.

This takes effort. The required information can be obtained from the Material Safety Data Sheet (MSDS) that must be supplied by the chemical manufacturer or importer to the purchaser for all hazardous materials under the Hazard Communication Standard. The MSDS is a summary of the important health, safety, and toxicological information on the

chemical or the mixture ingredients. Other stipulations of the Hazard Communication Standard require that all containers of hazardous substances in the workplace be labeled with appropriate warning and identification labels.

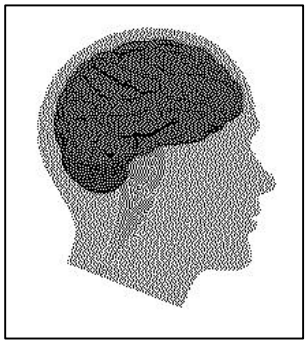
If the MSDS or the label does not give complete information but only trade names, it may be necessary to contact the manufacturer of the chemicals to obtain this information.

Many industrial materials such as resins and polymers are relatively inert and nontoxic under normal conditions of use, but when heated or machined, they may decompose to form highly toxic by-products. Information concerning these types of hazardous products and by-products must also be included in the company's Hazard Communication Program.



Breathing of some materials can irritate the upper respiratory tract or the terminal passages of the lungs and the air sacs, depending upon the solubility of the material. Contact of irritants with the skin surface can produce various kinds of dermatitis.

The presence of excessive amounts of biologically inert gases can dilute the atmospheric oxygen below the level required to maintain the normal blood saturation value for oxygen and disturb cellular processes. Other gases and vapors can prevent the blood from carrying oxygen to the tissues or interfere with its transfer from the blood to the tissue, thus producing chemical asphyxia or suffocation. Carbon monoxide and hydrogen cyanide are examples of chemical asphyxiants.

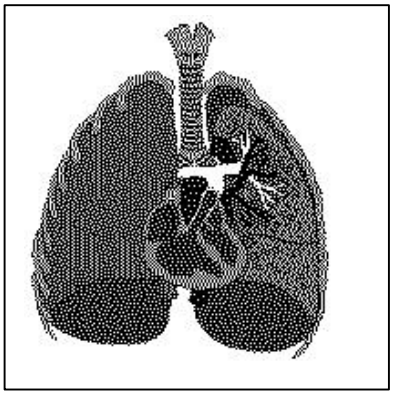


Some substances may affect the central nervous system and brain to produce narcosis and/or anesthesia. In varying degrees, many solvents have these effects. Substances are often classified according to the major reaction that they produce, as asphyxiants, systemic toxins, pneumoconiosis-producing agents, carcinogens, and irritant gases.

Routes Of Entry

In order for a harmful agent to exert its toxic effect it must come into contact with a body cell, and must enter the body through inhalation, skin absorption, or ingestion. Chemical compounds in the form of liquids, gases, mists, dusts, fumes, and vapors can cause problems by inhalation (breathing), absorption (through direct contact with the skin), or ingestion (eating or drinking.)

Inhalation



Inhalation involves those airborne contaminants that can be inhaled directly into the lungs and can be physically classified as gases, vapors, and particulate matter that includes dusts, fumes, smokes, and mists.

Inhalation, as a route of entry, is particularly important because of the rapidity with which a toxic material can be absorbed in the lungs, pass into the bloodstream, and reach the brain. Inhalation is the major route of

entry for many hazardous chemicals in the work environment.

Absorption

Penetration through the skin can occur quite rapidly if the skin is cut or abraded. Intact skin, however, offers a reasonably good barrier to chemicals. Unfortunately, there are many compounds that can be absorbed through intact skin.

Some substances are absorbed by way of the openings for hair follicles and others dissolve in the fats and oils of the skin, such as organic lead compounds, many nitro compounds, and organic phosphate pesticides. Compounds that are good solvents for fats (such as toluene and xylene) also can cause problems by being absorbed through the skin.

Many organic compounds, such as cyanides, and most aromatic amines, amides, and phenols, can produce systemic poisoning by direct contact with the skin. Absorption of toxic chemicals through the skin and eyes is the next important route of entry after inhalation.

Ingestion

In the workplace, people can unknowingly eat or drink harmful chemicals if they do not wash before eating or store drinking containers in the workplace. Toxic compounds are capable of being absorbed from the gastrointestinal tract into the blood stream. Lead oxide can cause serious problems if people working with this material are allowed to eat or smoke in work areas. In this situation, careful and thorough washing is required both before eating and at the end of every shift.

Inhaled toxic dusts can also be ingested in amounts that may cause trouble. If the toxic dust swallowed with food or saliva is not soluble in digestive fluids, it is eliminated directly through the intestinal tract. Toxic materials that are readily soluble in digestive fluids can be absorbed into the blood from the digestive system.

It is important to study all routes of entry when evaluating the work environment – candy bars or lunches in work area, solvents being used to clean work clothing and hands, in addition to air contaminants in working areas.

Injection

Another route of entry is injection, or stepping on something.

Air Contaminates

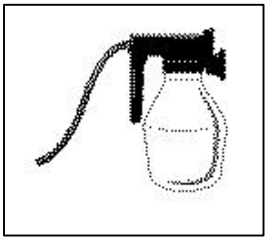
Air contaminates are commonly classified as either particulate contaminants or gas and vapor contaminants. The most common particulate contaminants include dusts, fumes, mists, and fibers.

Air contaminates are particles in the air. We measure particles by diameter. They are very small. These particles are measured in Microns. One Micron (1u) is equal to 1-one millionth of a meter. For example, a red blood cell is 7 Microns and bacteria is 1 Micron. Fumes range from .01 Microns to .10 Microns. Dust can be .01 Microns to as large as 100 visible Microns. Visible mists are usually between 10 and 100 Microns.

Gas and vapor concentrations are measured by "ppm" – parts of contaminant per million parts of air by volume.

Particulates (particles) concentrations are measured by "Mg/m^3" – Milligrams of contaminant per cubic meter of air.

Asbestos concentration is measured by "fibers/cc" – fibers per cubic centimeter of air.



To help us identify a health hazard, we have placed limits of measurements to each kind of contaminant. These are called PELS or permissible exposure limits. This is OSHA's legally allowed concentration in the workplace.

Aerosols

Aerosols include dust, fumes, mist and fibers.

Dust is solid particles generated by handling, crushing, grinding, rapid impact, detonation, and decrepitation (breaking apart by heating) of organic (carbon atom) or inorganic (non carbon atom) materials, such as rock, ore, metal, coal, wood and grain. Dust can enter the air from various sources, such as the handling of dusty materials, or during such processes such as grinding, crushing, blasting and shaking. Any process that produces dust fine enough to remain in the air long enough to be breathed should be regarded as hazardous until proven otherwise. An airborne dust of a toxic material will not cause pulmonary illness if its size is too large to gain access to the lungs. Otherwise, these particles will be deposited in the respiratory system long before they reach the alveolar sacs (the most important area in the lungs.)

Fumes can be created by heating liquids. This causes a vapor. If metal is heated to a liquid and vapor form, it results in fume particles. These fumes are formed when the material from a volatilized solid condenses in cool air. The solid particles that are formed make up a fume that is extremely fine. In most cases, the hot vapor reacts with the air to form an oxide. Gases and vapors are not fumes, although the terms are often mixed up. Welding and metalizing involving vapors from molten metals may produce fumes and may be harmful. Arc welding volatilizes metal vapor that condenses in the air around the arc. Other toxic fumes such as lead-based paints can produce severe symptoms in the absence of good ventilation or proper respiratory protection.

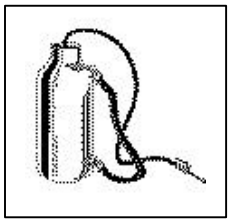
Mists are suspended liquid droplets generated by condensation of liquids from the vapor back to the liquid state or by breaking up a liquid into a dispersed state, such as by splashing or atomizing. The term mist is applied to a finely divided liquid suspended in the atmosphere.

Fibers are those particles having a slender, elongated structure with length several times as great as their diameter. Examples include asbestos, fibrous talc and fiberglass. Airborne fibers can be found in construction activities, mining, friction product manufacturing and fabrication, and demolition operations.

Gaseous

A gaseous phase includes gas, vapors and oxygen deficients.

Gases are formless fluids that expand to occupy the space or enclosure in which they are confined. Gases are a state of matter in which the molecules are unrestricted by cohesive forces. Examples are arc-welding gases, internal combustion engine exhaust gases, and air. Gases at room temperature are usually stored in gas cylinders. As the gas is released into the air, it can cause a vapor.



Vapors are the volatile form of substances that are normally in the solid or liquid state at room temperature and pressure. Evaporation is the process by which a liquid is changed into the vapor state and mixed with the surrounding atmosphere. Some of the most common exposures to vapors in industry occur from organic solvents. Solvents with low boiling points form vapors readily at room temperature. Solvent vapors enter the body mainly by inhalation, although some skin absorption can occur. Vapors start as a liquid at room temperature. As the liquid evaporates into the air it will create vapors, like in a solvent dip tank.

Physical Hazards

Toxic Health Hazards

Asbestos

Asbestos is a mineral that is typically used as insulation. This mineral is shaped as fibers that can sometimes become airborne. If you inhale these fibers, it can cause damage to your lungs.

The asbestos safety standard applies to all occupational exposures to asbestos, tremolite, anthophyllite and actinolite. “Asbestos” includes Chrysotile, Amosite, Crocidolite, tremolite asbestos, anthophyllite asbestos and actinolite asbestos.

Airborne Concentration

An employer must make sure that no employee is exposed to an airborne concentration of asbestos in excess of 0.2 fibers per cubic centimeter of air in an eight-hour period.

Respiratory Protective Equipment

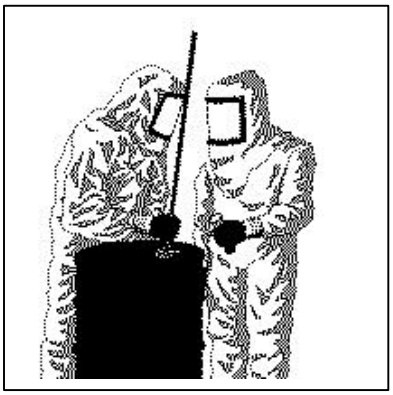
An employer must provide respirators and make sure that they are used. This includes the installation, maintenance, repairs and remove of asbestos.

Permissible Exposure Limits (PELS)

Permissible Exposure Limits (PELS) are enforceable by law. Employers must keep employee exposure levels below the PELs of regulated substances.

Hygiene Facilities and Practices

The employer must provide clean change areas for employees required to work in regulated areas. The change areas must be equipped with separate storage facilities for protective clothing and street clothing.



Change Rooms are clean rooms that are equipped with a locker or storage container for each employee's use.

Shower facilities must be provided. They should be connected to the equipment room and the clean change room.

Whenever food or beverages are consumed at the worksite and employees are exposed to airborne concentrations of asbestos, the employer must provide lunch areas in which the airborne concentrations of asbestos are below the exposure limits.

Smoking must ***never*** be permitted in an exposed asbestos area due to the risk of inhalation of the fibers.

Cancer and Lung Disease Hazard

Asbestos, tremolite, anthophyllite and actinolite can cause disabling respiratory diseases and various types of cancers if the fibers are inhaled. Inhaling or ingesting fibers from contaminated clothing or skin can also result in these diseases. The symptoms of these diseases generally do not appear for 20 or more years after initial exposure.

Exposure to asbestos, tremolite, anthophyllite and actinolite has been shown to cause lung cancer, mesothelioma and cancer of the stomach and colon. Mesothelioma is a rare cancer of the thin membrane lining of the chest and abdomen. Symptoms of mesothelioma include shortness of breath, pain in the walls of the chest, and abdominal pain.

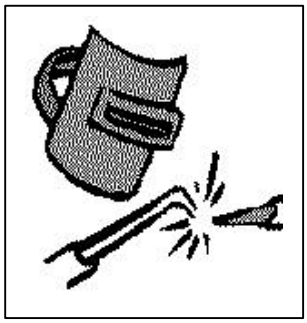
Medical Surveillance

The employer must have a medical surveillance program for all employees working with levels of asbestos.

Physical examinations should include pulmonary and gastrointestinal testing, including a chest roentgenogram.

Welding Health Hazards

Welding can cause many health hazards from the use of various chemical and physical agents.



Chemical Agents

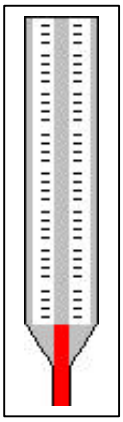
Zinc is used in large quantities in the manufacture of brass, galvanized metals and other alloys. Inhalation of zinc oxide fumes can occur when welding or cutting on zinc-coated metals. Exposure to these fumes is know to cause metal fume fever. Symptoms of metal fume fever (rarely exceeding 102 degrees), chills, nausea, dryness of the throat, cough, fatigue, and general weakness and aching of the head and body. Symptoms last for about 24 hours.

Cadmium is used as a rust-preventive coating on steel. Exposure to the fumes can produce severe lung irritation, pulmonary edema and death.

Beryllium is sometimes used as an alloy with copper. Exposure can result in shortness of breath, chronic cough, weight loss, fatigue and weakness.

Iron Oxide fumes are caused from iron combined with an electrode. The effect of this exposure is irritation of nasal passages, throat and lungs.

Mercury is used to coat metals to prevent rust. Under the intense heat of the arc or gas flame, mercury vapors are produced. Exposure to these fumes may produce stomach pain, diarrhea, kidney damage or respiratory failure. Long-term exposure may produce tremors, emotional instability and hearing damage.



Lead can cause lead oxide fumes with lead-based paint when welding and cutting surfaces that have been painted. Inhalation and ingestion of lead oxide fumes will cause lead poisoning. Symptoms include metallic taste in the mouth, loss of appetite, nausea, abdominal cramps and insomnia. In time, anemia and weakness of the muscles in the wrists will develop. Lead adversely affects the brain, central nervous system, circulatory system, reproductive system, kidneys and muscles.

Fluorides are found in the coatings of fluxes used in welding. Exposure to these fluxes may irritate the eyes, nose and throat. Repeated exposure of fluorides in the air may cause pulmonary edema (fluid in the lungs) and bone damage.

Chlorinated Hydrocarbon Solvents are used in degreasing or other cleaning operations. The vapors in welding and cutting, with heat and ultraviolet radiation from the arc, will decompose the vapors and form highly toxic and irritating phosgene gas.

Phosgene is formed by decomposition of chlorinated hydrocarbon solvents by ultraviolet radiation. It reacts with moisture in the lungs to produce hydrogen chloride that destroys lung tissue.

Carbon Monoxide is a gas formed by the incomplete combustion of fuels. The is an odorless and colorless gas that cannot be detected. Common symptoms of exposure include pounding of the heart, a dull headache, flashes before the eyes, dizziness, ringing in the ears and nausea.

Nitrogen Oxides are produced from the ultraviolet light of the arc in welding. This gas has a great health effect. It is irritating to the eyes, nose and throat, and dangerous concentrations can be inhaled without any immediate discomfort. High concentrations can cause shortness of breath, chest pain and fluid in the lungs (pulmonary edema).

Ozone is produced by ultraviolet light from the welding arc. Ozone is a highly active form of oxygen and can cause great irritation to all mucous membranes. Symptoms of ozone exposure include headache, chest pain, and dryness of the upper respiratory tract. Excessive exposure can cause fluid in the lungs.

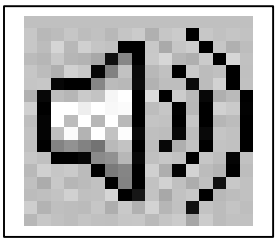
Physical Agents

Ultraviolet Radiation is generated by the electric arc in the welding process. Skin exposure to UV can result in severe burns. This radiation can also damage the lens of the eye. It can leave a sensation of sand in the eye. Ultraviolet rays also increase the skin effects of some industrial chemicals.

Infrared Radiation produced by the electric arc and other flame cutting equipment may heat the skin surface and the tissues immediately below the surface. Except for this effect, which can progress to thermal burns, infrared radiation is not dangerous to welders.

Intense Visible Light exposure of the human eye can produce adaptation, pupillary reflex and shading of the eyes. Such actions are protective mechanisms to prevent excessive light from being focused on the retina. At no time should the arc be observed without eye protection.

Noise



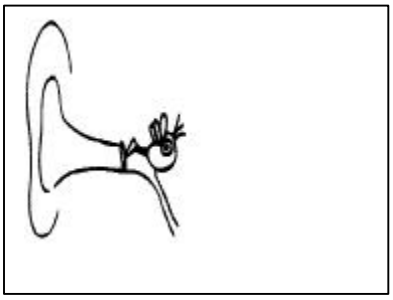
There are 2.9 million workers in American production industries who experience 8-hour noise exposures in excess of 90 dBA. An additional 2.3 million experience exposure levels in excess of 85 dBA. The Hearing Conservation Amendment (HCA) applies to all 5.2 million employees except for those in oil and gas well drilling and service industries.

The noise standard defines a permissible noise exposure level of 90 dBA for 8 hours and requires the employer to reduce exposure to that level by use of engineering and administrative controls.

Typical sound levels include:

- 140 dB – Threshold of pain
- 125 dB – Jet takeoff
- 95 dB – Jackhammer
- 85 dB – Heavy truck
- 75 dB – Vacuum cleaner
- 35 dB – Soft whisper
- 0 dB – Threshold of hearing

Hearing Loss Hazards and Risks



Short-term exposure: Temporary Threshold Shift (TTS) – ear recovers after rest period. For example, a radio in your car.

Long-term exposure: Permanent Threshold Shift (PTS) – irreversible sensori-neural damage to inner ear.

Risk of permanent hearing loss related to intensity and duration of noise exposure.

Psychological and Physical Disorders

Noise hazards may produce various psychological and physical disorders such as Annoyance, Fatigue, Elevation of Pulse Rate and Blood Pressure, Anxiety, Stress, Tension, Decrease in Productivity, Inattention and Sleeplessness.

Nature of Sound

Sound is the Ear/Brain response to rapid fluctuations in air pressure above and below ambient atmospheric pressure. Various measurements are used to measure sound:

- The threshold of hearing is based on air pressure changes.
- Frequency/Pitch is usually expressed in hertz (Hz).
- Wavelength is acoustics, usually expressed in feet.
- Speed of sound in air is measured in feet per second (fps).
- Sound Intensity/sound pressure level is measured in Decibel (dB) scale.

Hazards And Their Locations

There are three types of classified hazardous locations. The first type of hazard is one that is created by the presence of flammable gases or vapors in the air, such as natural gas or gasoline vapor. When these materials are found in the atmosphere, a potential for explosion exists, that could be ignited if an electrical or other source of ignition is present.

Some types of locations include petroleum refineries, and gasoline storage and dispensing areas; dry cleaning plants where vapors from cleaning fluids can be present; spray finishing areas; aircraft hangars and fuel servicing areas; and utility gas plants, and operations involving storage and handling of liquefied petroleum gas or natural gas.

The second type of hazard includes those areas having combustible dust. Finely pulverized material, suspended in the atmosphere, can cause as powerful an explosion as one occurring at a petroleum refinery. Some type of locations include grain elevators; flour and feed mills; plants that manufacture, use or store magnesium or aluminum powders;

producers of plastics, medicines and fireworks; producers of starch or candies; spice-grinding plants, sugar plants and cocoa plants; and coal preparation plants and other carbon handling or processing areas.

The third type of hazardous areas have easily-ignitable fibers or flyings present, due to the types of materials being handled, stored or processed. The fibers and flyings are not likely to be suspended in the air, but can collect around machinery or on lighting fixtures and where heat, a spark or hot metal can ignite them. Some of these locations include textile mills, cotton gins; cotton seed mills, flax processing plants; and plants that shape, pulverize or cut wood and create sawdust or flyings.

Ergonomic Hazards

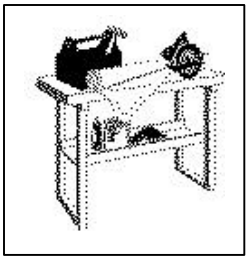
Ergonomics is the study of the design of requirements of work in relation to the physical and psychological capabilities and limitations of people. Ergonomic hazards exist whenever there is a combination of stressors or workplace conditions that may cause harm to an employee.

The task of identifying these hazards is a complex one for the employer and the investigator alike. Identifying deficiencies and designing corrective action is further complicated by the lack of any safety and health standards that specifically address ergonomic hazards.

Since 1990, both Federal OSHA and MNOSHA have had a special emphasis program in the meatpacking industry to identify and cite conditions leading to cumulative trauma disorders (CTDs). The Meat Packing Task Force was formed by MNOSHA to prepare inspection teams of both safety and health to handle the growing number of ergonomic complaints received in general industry outside the meat and poultry plants, the scope of the team's inspections was broadened and its name was changed.

Types Of Ergonomic Hazards

Ergonomic hazards include improperly designed tools or work areas. Improper lifting or reaching, poor visual conditions, or repeated motions in an awkward position can result in accidents or illnesses in the occupational environment. Designing the tools and the job to be done to fit the worker should be of prime importance. Intelligent application of engineering and biomechanical principles is required to eliminate hazards of this kind.



A workstation job hazard is determined by job requirements, including force, posture and repetition.

Symptoms and Testing

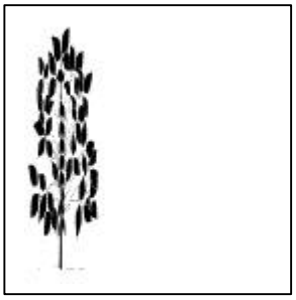
Injuries classified as CTDs (or ergonomic) must meet the following criteria:

- The illness must be work-related.
- A CTD must exist. There must be either physical findings (i.e. positive Tinel's, Phalen's, or Finkelsteins' test; or,

- Swelling, redness or deformity, or loss of motion; or,
- At least one subject symptom (i.e. pain, numbness, tingling, aching, stiffness, or burning) and,
- Medical treatment including self-administered treatment, lost workdays including restricted work activity, or transfer/rotation to another job.

Biological Hazards

Biological hazards include insects, molds, fungi, and bacterial contaminants such as sanitation and housekeeping items including potable water, removal of industrial waste, sewage, food handling and personal cleanliness. Biological and chemical hazards overlap.



Summary

During **Lesson 3** you learned what environmental factors are. You also learned the meaning of terms, general health rules and the requirements to protect you from chemical, physical, ergonomic and biological hazards.

This lesson should help you describe what environmental factors are, how to look for them, and how these environmental factors can cause sickness, impaired health or significant discomfort.

A detailed outline of Lesson 3 summarizes each area that you learned as follows:

A) Introduction

B) Purpose

   1) Objectives

   2) Outcomes

   3) Quiz

C) Safety Hazards Labeling

D) Chemical Hazards

   1) Routes Of Entry

      - Inhalation, Absorption, Ingestion, Injection

2) Air Contaminates

- Aerosols, Gaseous

E) Physical Hazards

1) Toxic Health Hazards

- Asbestos, Airborne Concentration, Respiratory Protective Equipment, Permissible Exposure Limits, Hygiene Facilities and Practices, Cancer and Lung Disease Hazard, Medical Surveillance

2) Welding Health Hazards

- Chemical Agents, Physical Agents

3) Noise

- Hearing Loss Hazards and Risks, Psychological and Physical Disorders, Nature Of Sound

4) Hazards and Their Locations

F) Ergonomic Hazards

1) Types Of Ergonomic Hazards

2) Symptoms and Testing

G) Biological Hazards

Lesson 3 Test – Environmental Factors

1. Safety hazards labeling is required by the:

a) Consumer Product Safety Act.

b) Federal Hazardous Substances Act.

c) Occupational Health and Safety Administration Act.

d) Federal Alcohol Administration Act.

2. In order for a harmful chemical agent to have its toxic effect, it must come into contact with the body. Which of the following is <u>NOT</u> a route of entry?

a) Noise or vibration through the ears.

b) Absorption through direct contact with the skin.

c) Inhalation or breathing.

d) Ingestion, eating or drinking.

3. Air contaminants are gases or vapors. What measurement is used to measure their diameter?

a) TWA.

b) PEL.

c) Micron.

d) ppm.

4. Asbestos is a mineral and a fiber. What kind of health hazard is it?

a) Chemical.

b) Physical.

c) Ergonomic.

d) Biological.

5. **Permissible Exposure Limits (PELS) are enforceable by law. Employers must keep employee exposure levels below the PELs of regulated substances. What level is required for an airborne concentration of asbestos?**

   a) 25 fibers per cubic volume of air in a forty-hour period.

   b) 0.3 fibers per milligram of vapor in an eight-hour period.

   c) 0.2 fibers per cubic centimeter of air in an eight-hour period.

   d) 0.01 fibers per square meter of surface in a forty -hour period.

6. **Welding can cause a health hazard called "metal fume fever" from the use of what chemical agent?**

   a) Zinc.

   b) Mercury.

   c) Lead.

   d) Ozone.

7. **Physical agents generated or produced during the welding process can cause severe burns or retina damage. Which agent is <u>NOT</u> a physical agent?**

   a) Ultraviolet radiation.

   b) Intense visible light.

   c) Infrared radiation.

   d) Lasers.

8. **There are more than 5 million workers in American industries that experience high levels of noise exposure in their jobs. The Hearing Conservation Amendment (HCA) requires noise exposure levels of 90dBA for 8 hours. What is the sound level of a jackhammer?**

   a) 140 dB.

   b) 125 dB.

   c) 95 dB.

   d) 75 dB.

9. Sound is the Ear/Brain response to rapid fluctuations in air pressure. Which of the items below is <u>NOT</u> used to measure sound?

a) The threshold of hearing is based on air pressure changes.

b) Particle concentrations are measured by milligrams per cubic meter of air.

c) Wavelength is acoustics, usually expressed in feet.

d) Sound intensity/sound pressure level is measured in Decibel (dB) scale.

10. Ergonomic hazards are measured in what units?

a) Cumulative Trauma Disorders (CTD).

b) Temporary Threshold Shift (TTS).

c) Permanent Threshold Shift (PTS).

d) Feet Per Second (FPS).

Lesson
4

4. Basic First Aid

Introduction

How to handle an emergency situation.

KEEP CALM. Remaining calm while helping the victim will help he/she to keep calm and cooperate. If the victim becomes anxious or excited the extent of the damage from the injury could be increased.

PLAN QUICKLY WHAT YOU NEED TO DO. Learn basic procedures, or have your first aid manual available, so you can care for the victim.

SEND FOR PROFESSIONAL HELP. Reaching help quickly could save a life. Know your local emergency telephone numbers.

BE AN ENCOURAGEMENT TO THE INJURED PERSON. Let the victim know that help is on the way and try to make them as comfortable as possible. Showing care and concern for the victim can give them hope during their circumstances.

Purpose

In **Lesson 4** you learn about basic first aid, what to look for and what to do.

Objectives

You learn how to recognize health issues and symptoms in your workplace, and can care for basic treatments of victims.

Outcomes

After completing Lesson 4, you will have a reference source to provide for some of the most common first aid practices.

Quiz

1. What is the proper name given to a low level of oxygen?

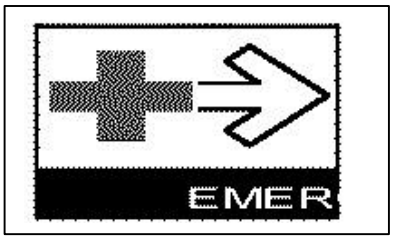
   A) Bradycardia.
   B) Hypoxia.
   C) Tachycardia.
   D) Hypothermia.

2. What is NOT included in a basic First Aid Kit?
   A) Bandages.
   B) Aspirin.
   C) Splints.
   D) Tape.

3. What is the symptom of a sprain?

   A) Affected joint begins to swell immediately.
   B) Victim begins to faint.
   C) High fever.
   D) Loss of weight.

First-Aid Trained Personnel



Some employers are required to have trained personnel and first responders available at the job site. All employers must provide medical consultation on worker health.

This lesson does not cover all aspects of medical conditions, treatments or diagnosis. You should always rely on professional assistance whenever possible. Those first aid topics provided can help guide you through basic treatments of common first aid in the workplace.

Definition of Conditions

Bradycardia – slow heartbeat

CPR – Cardio-Pulmonary Resuscitation

Exposure - hypothermia

Fracture – a break or crack in a bone

Heat Exhaustion – condition where the body temperature rises above normal and person feels sick and dizzy

Heat Stroke – very serious condition when the body loses ability to regulate its own temperature and internal temperature rises to a dangerous level (104F and above)

Hypothermia – body becomes too cold (below 95F)

Hypoxia – low level of oxygen

Laceration – rough, ripped wound

Myocardial Infarction (MI) – heart attack

Shock – insufficient oxygen getting to where it is needed in the body

Tachycardia – heart beating too quickly

Unconsciousness – interruption of brain's normal activity so that it is no longer aware of its surroundings

First Aid Kit

Contents

The essentials:

- First Aid Manual (clearly explains how to handle basic problems).
- Basic Bandages (assorted adhesive bandages, athletic tape, moleskin)
- Basic Drugs/Lotions (aspirin, antiseptic, antacid tablets)
- Basic First Aid Tools (tweezers, small mirror, razor blade)
- CPR Shield

The extras:

- Additional bandages (gauze pads, ace bandages, butterfly bandages)
- Additional Drugs/Lotions (burn ointment, skin lotion, Caladryl)
- Additional First Aid Tools (sling, basic splint, instant ice pack)

Cleaning and Bandaging Wounds

Wash your hands and cleanse the injured area with clean soap and water then blot dry.

Apply antibacterial ointment to minor wound and cover with a sterile gauze dressing or bandage that is slightly larger than the actual wound.

First Aid Treatments

Bites and Stings

Animal bites and bee stings are the most common. Spider bites, ticks and Lyme disease and snakebites are NOT covered in this section.

Animals

Animal Bites, Basic First Aid Treatment:

- Control any bleeding by applying direct pressure or with elevation. To avoid risk of infection, DO NOT close wound.
- Rinse the bite thoroughly, holding it under running water. Cleanse with soap and water and hold under water again for five minutes.
- DO NOT put ointments or medicines on wound. Cover with dry sterile bandage or gauze.
- SEEK MEDICAL ASSISANCE IMMDEDIATELY.

Note: Report animal and human bites to local police and/or health authorities.

Bees

Basic First Aid Treatment:

- If possible, remove stinger by scraping it off with a blunt edge (e.g. credit card).
- Watch for signs of shock or allergic reaction. Signs include swelling or itching at the wound site, dizziness, nausea or difficulty breathing.
- Check victim's Airway, Breathing, and Circulation (ABC's) then begin CPR if necessary, and call 911. IMPORTANT: Only trained and qualified person should administer CPR.
- Clean wound and apply cold compress to reduce swelling.
- Remove tight clothing and jewelry from areas near the bite in case swelling occurs.
- Continue monitoring victim for shock until medical help arrives.

Burns

Never put butter or greasy ointments on a burn. They seal heat into the wound and may cause infection. Always seek medical attention if the victim is a child or elderly, burn covers more than one body part, burn is located on any sensitive area of the body (hands, face, feet), burn is third degree or the burn is caused by chemicals.

First Degree Burn: Skin will appear red and may be swollen or painful. Generally does not require medical attention.

Second Degree Burn: Skin will appear red, blistered and swollen. May require medical attention.

Third Degree Burn: Skin will be visibly charred and may be white. Usually very painful. REQUIRES MEDICAL ATTENTION.

Basic First Aid Treatment for First Degree and Some Second Degree Burns:

- Submerge burn area immediately in cool water until pain stops. If affected area is large, cover with cool wet cloths. Do not break blisters if they are present.
- If pain persists but no medical assistance is needed, apply medicated first aid cream or gel and cover with sterile dressing.
- If medical attention is needed, do not apply any cream. Just cover with a dry, sterile dressing and seek medical help immediately.

Basic First Aid Treatment for Third Degree and Some Second Degree Burns:

- Call 911! Third degree burns MUST RECEIVE MEDICAL ATTENTION IMMEDIATELY!
- DO NOT try to remove any clothing stuck to the burned area. Cover with sterile dressing or clean sheet.
- DO NOT apply any creams or gels.

Chemical

Basic First Aid Treatment:

- Flush the affected area with cool running water for at least 15 minutes.
- Remove all clothing and jewelry that has been contaminated.
- Monitor victim for shock and seek medical assistance.
- If chemical burn is in the eyes, flush continuously with water and SEEK MEDICAL ATTENTION IMMEDIATELY.

Sunburn

- Avoid any further exposure to direct sunlight.
- Drink plenty of water to prevent dehydration.

- DO NOT apply cold water or ice to a severe burn.
- Use over-the-counter remedies to remove discomfort.
- If burn is severe and blisters develop, SEEK MEDICAL ATTENTION.

Cuts and Abrasions

The proper treatment for Cuts:

- Cleanse area thoroughly with soap and warm water, carefully washing away any dirt.
- Apply direct pressure to wound until bleeding stops.
- Put sterile bandage on wound.
- If cut is deep, get to a doctor as quickly as possible.

The proper treatment for Abrasions (Scratches):

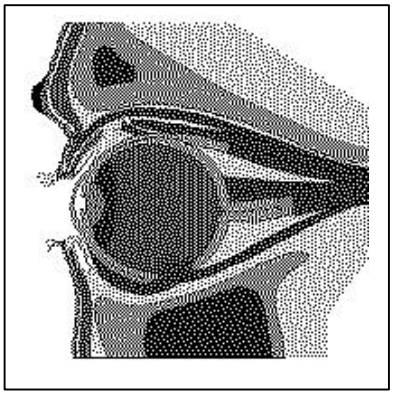
- Wash thoroughly with soap and warm water.
- If it bleeds or oozes, bandage it to protect it from infection.

Signs of an infected wound:

- Swelling
- Redness
- Pain
- May cause fever
- Presence of pus

Eye Injuries

If object is impaled in the eye, call 911 and DO NOT remove the object.



- Cover both eyes with sterile dressings or eye cup to immobilize. Covering both eyes will minimize the movement of the injured eye.
- DO NOT rub or apply pressure, ice, or raw meat to the injured eye.
- If the injury is a black eye, you may apply ice to cheek and area around eye, but not directly on the eyeball itself.

How to flush the eyes:

If chemical is in only one eye, flush by positioning the victim's head with the contaminated eye down to prevent flushing the chemical from one eye to another. Flush with cool or room temperature water for 15 minutes or more. Remove contact lenses after flushing.

Dislocations

The most common dislocations occur in the shoulder, elbow, finger or thumb.

Look for these signs:

- Swelling
- Deformed look
- Pain and tenderness
- Possible discoloration of the affected area

If a dislocation is suspected:

- Apply a splint to the joint to keep it from moving.
- Try to keep joint elevated to slow blood flow to the area.
- A doctor should be contacted to have the bone set back into its socket.

Fainting and Unconsciousness

Before losing consciousness, the victim may complain of:

- Lightheadedness
- Weakness
- Nausea
- Skin may be pale and clammy

If a person begins to feel faint, he should:

- Lean forward
- Lower head toward knees

As the head is lowered below the heart, blood will flow to the brain.

What to do if someone faints:

The RECOVERY POSITION

- Keep the victim lying down with head lowered and legs elevated
- Loosen any tight clothing
- Apply cool, damp cloths to face and neck

In most cases, the victim will regain consciousness shortly after being placed in this position.

After the victim regains consciousness, do not let him get up until you have questioned him (Who are you?, Do you know what day it is?) to be sure he has completely recovered.

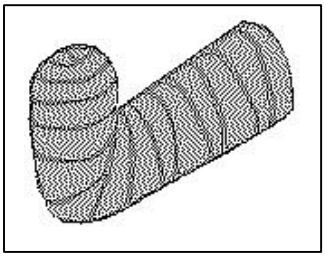
Basic First Aid for Unconsciousness:

- DO NOT leave an unconscious victim alone except to call 911 for medical help.
- Assess victim's state of awareness by asking if they are OK.
- Check the victim's **A**irway, **B**reathing, and **C**irculation (**ABC**'s).
- If the victim's ABC's are not present, perform CPR. *IMPORTANT*: Only a trained and qualified person should administer CPR.
- If ABC's are present and spinal injury is not suspected, place victim on their side with their chin toward the ground to allow for secretion drainage.
- Cover the victim with blanket to keep warm and prevent shock. If victim communicates feeling warm, remove blanket.

Fractures

A **SIMPLE FRACTURE** does not pierce through the skin. If it is not cared for properly, it could become a compound fracture.

If a fracture is suspected:



- Check for swelling around the affected area
- There may be discoloration of the skin
- If the victim complains of tenderness and pain in the area or says that he felt or heard a bone snap, see a doctor immediately.

A **COMPOUND FRACTURE** pierces through the skin. Serious bleeding may occur with this kind of wound. Do not apply pressure to a compound fracture to stop the bleeding.

What to do for a compound fracture:

- Cover the injured part with a sterile pad
- Apply a splint to keep the bone from causing further injury to the surrounding tissues
- Wait for medical help
- Avoid moving the victim, but keep him warm, comfortable, and reassured.
- Apply a splint.

Frostbite

- Take the victim indoors if possible.
- Remove any wet clothing he/she may have on.
- Immerse the frostbitten parts in warm (not hot) water until they regain their pink color. If warm water is not available, wrap the affected parts gently in a sheet and warm blankets and keep the parts elevated.
- Do not rub or massage the frostbitten area. This could cause gangrene (decay of body tissue when the oxygen supply is obstructed) to set in.
- Do not try to warm the victim with a heat lamp or hot water bottle or place him near a hot stove. This could also cause gangrene.

- Do not break any blisters the victim may have because the blisters may become infected.
- If the victim is conscious and is not vomiting, give him warm liquids to drink to help the warming process.

After the frostbitten parts are warmed, have the victim exercise them to maintain good circulation in those areas.

If the victim's toes or feet are frostbitten, do not let them walk until they are warm. Walking could cause gangrene just as rubbing can.

A doctor should be seen as soon as possible to make sure the parts heal properly.

Hypothermia

Symptoms:

- Vigorous, uncontrollable shivering

As hypothermia progresses

- Dizziness
- Lightheadedness
- Muscular stiffness
- Difficulty in moving

If no treatment is given

- Slurred speech
- Slow pulse
- Memory loss

If still no treatment is given

- Unconsciousness
- Eventual death

Treatment:

The body temperature must be raised slowly. Warming the victim's body too quickly could cause tissue damage.

- Take him/her indoors or to an area of shelter
- If the victim's clothes are wet, have him remove them and replace them with warm, dry clothes as soon as possible.
- The victim may want to wrap up in a blanket and sit near a heater or fireplace until he is warm.
- Give the victim warm liquids (i.e. hot apply cider, soup) if he/she is fully conscious.
- The victim should not drink liquids that contain caffeine.
- Make sure the victim gets medical attention as soon as possible.

Nosebleeds

Causes:

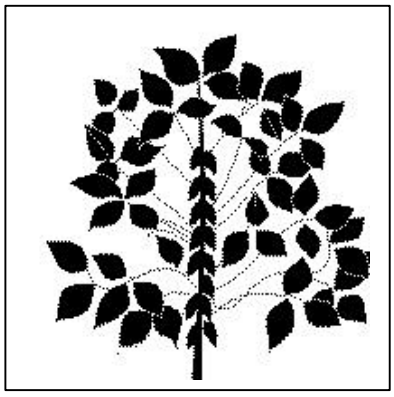
- Nose injury
- Strenuous activity
- High blood pressure
- Exposure to high altitudes
- Blowing your nose too hard

What to do if you get a nosebleed:

- Sit down
- Lean slightly forward to prevent blood from running into your throat
- Place cold, wet cloths on your nose to constrict the blood vessels in your nose and stop the bleeding
- If blood is coming from only one nostril, press firmly at the top of that nostril
- If both nostrils are bleeding, pinch your nostrils together for at least 10 minutes
- If the bleeding is the result of direct injury to the nose, only gentle pressure should be applied
- If heavy bleeding persists or if nosebleeds recur frequently, consult a physician.

Poisoning

Signs of Poison Ivy, Poison Oak and Poison Sumac:



- Rash
- Blistering
- Swelling
- Burning
- Itching

Treatment:

- Remove any contaminated clothing.
- Wash the affected area of skin thoroughly with soap and cool water to remove any poisonous residue. Be sure the water used to clean the area

does not spread poison by running over other parts of your body. Using a washcloth could also spread the poison.
- Rinse the area with rubbing alcohol.
- Apply calamine lotion to the area to relieve itching and burning.
- If the victim develops a fever for several days or experiences an excessive amount of inflammation, irritation, oozing, or itching, he/she should be treated by a doctor.

Emergency Actions To Take for Internal Poisons:

- CALL your local Poison Control Center or 911 for immediate medical attention.
- Antidotes on labels may be WRONG! DO NOT follow them unless instructed by a physician.
- NEVER give anything by mouth (milk, water, Ipecac, etc.) until you have consulted with a medical professional.
- Keep a one ounce bottle of Ipecac on hand at all times in case of an emergency, and give only when instructed by a physician.
- If the poison is on the skin, flush skin with water for 15 minutes, then wash and rinse with soap and water.
- If poison is in the eye, flush with lukewarm water for 15 minutes. Adults can stand under the shower with eyes open. ALWAYS CONSULT medical professionals after any eye injury has occurred.

Sprains

Signs of a strain:

- Affected joint begins to swell immediately
- Joint may also turn black and blue due to the escaped blood from torn blood vessels
- Victim will experience excruciating, shooting pains at the time of the injury because many nerves are injured in a sprain

Treatment:

- RICE treatment
- Thermotherapy (applying moist heat) promotes healing but should not be applied to a muscle or ligament injury for at least 24 hours because heat will increase the swelling. After the swelling has gone, you should alternate applying cold compresses and moist heat to the injury.
- To treat the injury with warm, wet packs, place a water-dampened towel in a microwave oven for about 30 seconds. Check to make sure the towel is not too hot before placing it on the skin. If a microwave oven is not available, run a towel under very hot tap water, wring it out, and apply it to the injury.
- A sprained arm should be placed in a sling.
- Most sprains take at least 6-8 weeks to heal.

Bleeding

Before providing aid, put on protective gloves or use a barrier between you and the victim, to reduce the chance of disease transmission while assisting the injured person. Cleanse your hands thoroughly with soap and water when finished.

Basic First Aid Treatment:

- Call 911 for medical assistance.
- Keep victim lying down.
- Apply direct pressure using a clean cloth or sterile dressing directly on the wound.
- DO NOT take out any object that is lodged in a wound; see a doctor for help in removal.
- If there are no signs of a fracture in the injured area, carefully elevate the wound above the victim's heart.
- Once bleeding is controlled, keep victim warm by covering with a blanket, continuing to monitor for shock.

Choking

Basic First Aid Treatment:

- Ask the victim, "Are you OK?"
- DO NOT interfere or give first aid if the victim can speak, breathe, or cough.
- If the victim cannot speak, breathe, or cough, ask for someone to call 911 and then perform the Heimlich Maneuver (abdominal thrust).

How to perform the Heimlich Maneuver:

Position yourself behind the victim with your arms around victim's stomach. Place the thumb-side of your fist above the victim's navel and below the lower end of the breastbone. Take hold of your fist with your free hand and pull fist upward and in, quickly and firmly. Continue with thrusts until the object is dislodged or airway is clear.

Infant Choking

- Place infant face down on your forearm supporting the head and neck with your hand. Rest your hand on your knee with the infant's head lower than it's body.
- With the heal of your hand give four blows between the shoulder blades.
- Turn infant over and perform four chest thrusts with two fingers between their nipples.
- Repeat until obstruction is clear.

SEEK MEDICAL ATTENTION AFTER ANY CHOKING INCIDENT, SINCE COMPLICATIONS MAY ARISE.

Summary

In **Lesson 4** you learned about basic first aid, what to look for and what to do.

You learned how to recognize health issues and symptoms in your workplace, and how to care for basic treatments of victims.

You were given a reference source to provide for some of the most common first aid practices.

A detailed outline of Lesson 4 summarizes each area that you learned as follows:

A) Introduction

B) Purpose

1) Objectives

2) Outcomes

3) Quiz

C) First Aid Trained Personnel

D) Definition Of Conditions

E) First Aid Kit

1) Contents

- The Essentials, The Extras

F) Cleaning and Bandaging Wounds

G) First Aid Treatments

- Bites and Stings, Burns, Cuts and Abrasions, Eye Injuries, Dislocations, Fainting and Unconsciousness, Fractures, Frostbite, Hypothermia, Nosebleeds, Poisoning, Sprains, Bleeding, Choking

Lesson 4 Test – Basic First Aid

1. **Which of the following trained medical personnel are <u>NEVER</u> required to be at the job site?**

   a) First responder.

   b) Nurse.

   c) Dentist.

   d) Emergency Medical Technician.

2. **What is the term used to describe a condition where the body temperature rises about normal and the person feels sick and dizzy?**

   a) Exposure.

   b) Myocardial Infarction.

   c) Shock.

   d) Heat exhaustion.

3. **Which items are typically NOT found in a first aid kit?**

   a) First Aid Manual.

   b) Basic Bandages.

   c) Basic Needles and Syringes.

   d) Basic Drugs/Lotions.

4. **What should you <u>NOT</u> do when cleansing and bandaging wounds?**

   a) Wash your hands.

   b) Cut away dead skin.

   c) Apply antibacterial ointment.

   d) Cover with a sterile gauze dressing.

5. What type of burn is visibly charred and may be white?

a) Sunburn.

b) First degree burn.

c) Second degree burn.

d) Third degree burn.

6. Symptoms of lightheadedness, weakness, nausea and skin that may be pale or clammy usually indicates what possible condition?

a) Drunk.

b) Fainting.

c) Food poisoning.

d) Hypothermia.

7. The most common dislocations DO NOT occur in?

a) Shoulders.

b) Elbows.

c) Fingers.

d) Knees.

8. Vigorous, uncontrollable symptoms of shivering indicate?

a) A wind chill of minus 20 degrees Fahrenheit.

b) Shock.

c) Hypothermia.

d) Seizure.

9. Basic first aid includes the term “ABCs”. What do these letters <u>NOT</u> stand for?

a) Breathing.

b) Circulation.

c) Sterilization.

d) Airway.

10. The Heimlich Maneuver is used for what symptom?

a) Heart attack.

b) Choking

c) Fainting.

d) Frostbite

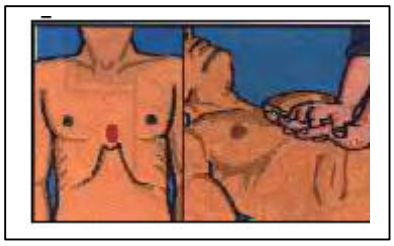
Lesson
5

5. CPR

Introduction

This section is intended as a supplement to information learned in a complete CPR course instructed by OSHA and the American Heart Association. It is not to be used as your only guide for CPR unless in emergency situations. Please use this only as a guideline for the proper steps in CPR. For more information, please contact OSHA or your local American Heart Association for class information.

CPR (Cardio Pulmonary Resuscitation) may well be the most valuable skill you will ever learn. Over and over again, CPR has been shown to prolong life until trained medical personnel arrive to administer professional care. CPR has been used primarily to revive victims of cardiac arrest, but it as also saved victims of drowning, respiratory failure, and drug overdose.



Knowing what to do in the first minutes after an emergency has occurred can make a big difference in the outcome. Although this lesson is no substitute for a formal first aid and CPR course, reviewing this information can help you to be better prepared for that unexpected crisis.

Before we review what you SHOULD do, let's look at a few things you SHOULD NOT do:

- Do NOT panic! You can help a lot more if you remain calm, take a deep breath, and think out your actions!
- Do NOT let the victim panic! (Even if it's you!) Panic increases blood pressure, pulse and respiration which can complicate the medical emergency!
- Do NOT forget your own safety! LOOK at the whole scene! If you get injured, you can't help anyone!
- Do NOT be afraid to ask for help! Use all the resources you need: neighbors, bystanders, etc. If you remain calm and assume a leadership role in the emergency, most people will be more than willing to listen and help however they can.

This is intended as a supplement to information learned in a complete CPR course instructed by the American Heart Association. It is not to be used as your only guide for CPR unless in emergency situations. Please use this only as a guideline for the proper steps in CPR.

More than five million people each year receive CPR training from instructors taught by the American Heart Association or the American Red Cross. The timely application of CPR has helped thousands of lives each year in the United States. Better understanding of CPR and refinements in its use can help save more lives.

The American Heart Association and the American Red Cross, the organizations responsible for most CPR training in the United States, adopted new CPR science guidelines on October 28, 1992. The new guidelines recommend …

- Addition of the recovery position (rolling the victim on his or her side) to all procedures for victims who are breathing effectively on their own, or who resume effective breathing at any time during the delivery of resuscitation efforts.

- Repositioning the victim's head after each unsuccessful attempt to ventilate, before re-attempting ventilation.

Most of these changes have been developed to improve the victim's changes of recovery, and also to simplify teaching CPR skills.

Outcomes

In Lesson 5 you will learn the principles and procedures used in administering CPR. Please use this only as a guideline for the proper steps in CPR. For more information, please contact OSHA or your local American Heart Association for class information.

Quiz

1. CPR stands for?

   A) Corrective Procedures For Recordkeeping.
   B) Cardio Pulmonary Resuscitation.
   C) Critically Proven Regulations.
   D) None of the above.

2. The ABCs of CPR is?

   A) Airway.
   B) Breathing.
   C) Circulation.
   D) All of the above.

3. Do not use your thumb to take the pulse of someone else because:

   A) You will be feeling your own pulse.
   B) Two of your fingers against a victims' neck will indicate the pulse of the victim.
   C) If the victim has no pulse, they need CPR immediately.
   D) All of the above.

For ALL Emergencies

Quickly assess the patient for:

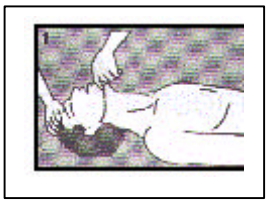
Airway: Is the airway open or blocked? Is there something preventing the patient from being able to breathe? If there is, you need to CLEAR THE AIRWAY quickly! If it IS clear, make sure it stays that way!

Breathing: Is the patient breathing? If NO, you must act quickly and perform Rescue Breathing! If YES, note the rate and depth. If breathing is really slow and/or shallow, you'll need to help them breathe properly.

Circulation: If the patient is unconscious, press two fingers gently against the side of their neck just below the jaw and feel for a pulse. If their conscious, check there or at their wrist. DO NOT use your thumb to check a pulse, you'll feel your OWN pulse! If there's NO PULSE, the patient needs CPR Now! If the pulse is weak and/or rapid, the patient may be going into shock!

Airway Obstructions

There are two ways of clearing an obstructed airway. The method you use depends on whether the patient is CONSCIOUS or UNCONSCIOUS.



Unconscious Patients

1. With the patient laying on their back, place two fingers under each side of their jaw and gently push the jaw straight up and out. DO NOT tilt their head back if they have suffered a traumatic injury, i.e. fall, auto-accident, head injury, etc. This maneuver will lift the tongue up and away from the back of their throat.

2. If the patient doesn't breathe after step 1, try giving them a breath using the Rescue Breathing technique. If you still cannot get any air to go in, go to the next step.

3. Using two fingers slightly bent, start at one side of their mouth and sweep down and out to remove any obstruction from their mouth and upper throat. NEVER use this technique on a CONSCIOUS patient!

4. Attempt step 2 again. If you still cannot get any air in, you need to perform abdominal thrusts to try and force the obstruction out. To do this, straddle the patient's legs on your knees, facing towards the head. Interlock your fingers with one hand on the other. Place the heel of the bottom hand just above the belly button, then moderately compress the abdomen in an upward direction 8-10 times.

5. Go back to step 2. If the patient is still not breathing and you still cannot get any air to go in, you will need to repeat these steps. A deeply embedded obstruction can be difficult to remove, but failure to remove it will likely result in death!

Conscious Patients

1. Determine that the patient is choking. The universal signal for choking is a person grabbing their throat. The may still be able to pass some air, in which case you'll hear wheezes as they try to breathe. However, if the patient is able to cough forcefully, DO NOT interfere. Encourage them to continue coughing to force the obstruction out.

2. DO NOT put your fingers or any other object into their mouth! The exception would be if you can visualize the object, but even then it is not recommended, as you may accidentally push the object farther into their airway.

3. If the patient can stand up, have them do so. You will need to perform the Heimlich Maneuver now.

4. Standing behind and facing the patient, reach your arms around them.

5. Make a fist with one hand and hold it with the other. Place your fist in the middle of their stomach, just above the belly button.

6. In a sharp thrusting motion, press in and upwards to try and force air and the obstruction out of the patient.

7. If the obstruction gets cleared, the patient will usually take a big gasp, which will be your signal that you have successfully saved a choking victim! Monitor the patient for several minutes to make sure they are now able to breathe.

8. If the first thrust does not succeed, you may need to repeat the procedure. Recheck the patient after each attempt.

9. If the obstruction persists, the patient will likely become unconscious, in which case you'll need to continue by treating them according to the UNCONSCIOUS Airway Obstruction method.

Rescue Breathing

Rescue breathing (mouth-to-mouth) is a simple, quick technique that can make the difference between life and death for a non-breathing person. To perform emergency rescue breathing, follow these steps:

1. Make sure the victims' airway is clear, as outlined above.

2. If at all possible, use a protective device such as a CPR microshield or pocket mask to protect yourself.

3. Place yourself beside the victim's head, looking down towards their chest.

4. Insure the victim's head is in the neutral position, with their neck in a straight line with their back.

5. Place the palm of one hand on their forehead, and use your thumb and forefinger to pinch their nose shut.

6. Make a firm seal between the victim's mouth and the protective device or your mouth.

7. Give one steady, full breath, watching their chest to assure that you see the chest rise with the breath.

8. Allow the air to escape naturally from the victim. Repeat this procedure immediately from step 5.

9. After the second breath, look, listen and feel for any spontaneous respiration from the victim.

10. Also after you give the second breath, check for a pulse! If the victim has no pulse, someone needs to start CPR promptly!

11. As long as the victim is not breathing on their own, you need to continue this procedure. A continuous supply of oxygen can greatly reduce the chance for permanent brain damage or death!

Treatment of Shock

Shock, defined as inadequate tissue perfusion, can occur for a variety of reasons. The most common include blood loss, failure of the heart to pump properly, extreme allergic reaction, and neck/spine injury. Regardless of the cause, there are several symptoms that will indicate the victim is suffering from shock:

- Their mental status/alertness decreases

- Skin color may be pale. If their color is blue, this indicates a lack of oxygen and Rescue Breathing may be indicated!

- Their pulse may be weak, thready and rapid. They may not even have a pulse at their wrist, so check at their neck for a carotid pulse!

- Squeeze their fingernail and observe the color change. If it takes more than 1-2 seconds for the nailbed to return to pink, this indicates extremity circulation has already begun to shut down.

- Remember, if you can check a blood pressure that decreased blood pressure is a LATE and very serious sign of shock.

Once you have determined or suspect a victim is in shock, there are several things you can do to help reduce the damage of shock and to stabilize them until more help arrives:

1. Keep the victim calm and still. DO NOT allow them to move their head/neck as they may have a spine injury.

2. Keep the victim insulated. Loss of body heat can result from circulation being routed from the extremities to their vital organs.

3. Elevate their feet about 15 degrees, which helps keep the blood closer to vital organs.

4. Control any external bleeding by applying direct pressure to the wound.

5. Closely monitor their respiration and be prepared to assist if needed using the Rescue Breathing technique.

Seizures

Seizures can have many causes, the most common being epilepsy, heat injury, brain/head injury, and overdoses. Again, whatever the cause, there are some do's and don'ts when helping a seizure victim:

- DO NOT try to forcibly restrain or stop the victim from seizing. You can cause more injury.

- Protect the victim during the seizure by removing any obstacles or objects they could be injured from.

- DO NOT put anything in their mouth! It is impossible to swallow the tongue, and serious complications can result if an object gets bit off or otherwise lodged in their airway!

- Watch for vomiting! If the victim begins to vomit, turn them on their side to help avoid inhalation and choking.

- After the seizure, it is normal for the victim to be unresponsive for several minutes. Monitor them closely for respiratory problems, but again, DO NOT put anything in their mouth!

- Check the victim for any medical alert tags, bracelets or chains. You may be able to determine if the victim has a history of seizures.

- Attempt to determine the cause of the seizure, and be prepared to describe what happened before, during and after the seizure.

Chest Pain/Heart Attack

Anyone suffering from chest pain should be evaluated by a Physician as early as possible. Although there are numerous reasons for chest pain, you CANNOT rule out a heart attack with seeing a doctor! There are some specific symptoms of a heart attack, which include:

- Tightness/pressure in center of chest

- Sweaty, clammy skin

- Numbness in one or both shoulders or pain radiating down either or both arms
- Shortness of breath and/or feeling of impending doom

IMPORTANT: A heart attack can be signaled by any or NONE of these symptoms. Just because a person isn't suffering all of the above does NOT mean they aren't having a heart attack! When in doubt, seek treatment!

The best thing you can do for someone suffering from chest pain is to encourage them to seek prompt medical attention! Denial is very common among heart attack victims, so be positive and encouraging, but stern in your insistence that they seek help! The key here is that "TIME IS MUSCLE" … the longer the victim waits, the more permanent damage the heart muscle suffers.

How CPR Saves Lives

CPR is a combination of mouth-to-mouth resuscitation and chest compression. "Mouth-to-mouth helps get air into the victim's lungs while chest compression forces oxygen-rich blood to the brain and other organs. The key components of successful CPR are timing and training. Timing, because unless CPR is administered within 4 minutes of an arrest, the brain can be irreversibly damaged from lack of oxygen. Training, because too violent chest compression can cause the chest wall to cave in, while too-mild chest compression can fail to force adequate blood supplies to the brain.

Training

Who Needs Training?

The obvious answer is "everyone," but that, of course, is too easy to say. Generally, anyone who is physically able to administer the technique should be trained, particularly those who may have a family member who is at high risk for cardiac arrest or respiratory failure. High risk groups include people with a personal or family history of heart attacks, previous cardiac arrests, angina, high blood pressure, or extreme overweight.

Where To Train

If you are interested in taking a CPR training course, contact you local chapters of the American Red Cross, or the American Heart Association. The National Heart, Lung and Blood Institute, or the American College of Cardiology may also provide resources and referral. (Check your phone book for listings in your area.) Many community hospitals, fitness centers, and worksite health promotion programs now offer CPR training. Your local Fire Department most likely offers free CPR training to the public.

Emergency Guidelines For Performing Adult CPR

CPR is a combination of mouth-to-mouth resuscitation and chest compression.

Safety

Make sure the scene is safe for you to help.

Precautions

Make sure you have universal precautions: gloves, pocket mask, etc. Make sure you know how many victims you may have to help.

Consciousness

Determine if they are conscious by tapping and shouting “Are you OK?”

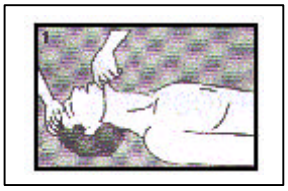
911

If they are unconscious and not responding, have someone call 911.

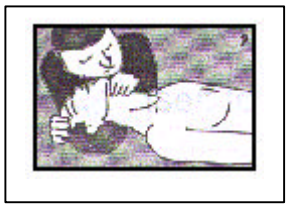
STEP 1: A = Airway

Open Airway

Position the patient on their back. Open the airway with a head-tilt chin-lift or jaw-thrust maneuver.

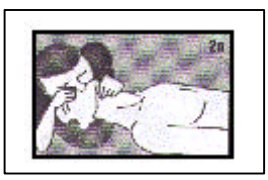


STEP 2: B = Breathing



Breathing

Look, listen and feel for evidence of breathing. Check breathing for 5-10 seconds.



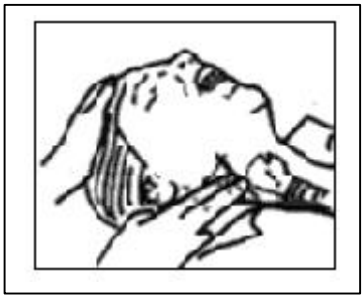
Ventilation

If they aren’t breathing, ventilate twice. Give two strong breaths into the person’s mouth. Check that the rib cage rises with each breath. If this does not occur, repeat STEP 1.

STEP 3: C = Circulation

Pulse

Check for a pulse by palpating (feeling) the carotid artery. Check the pulse for 10 seconds. If there is a pulse, give the patient mouth to mouth breathing until breathing returns.

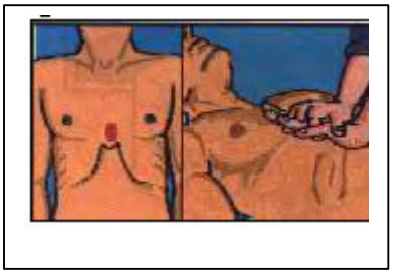


Chest Compressions

If there is no pulse, lie the patient flat on his back.

Single Operator

Kneel beside the person. Place the heel of one of your palms on the lower half of his breastbone, and the heel of your other palm on top of the first one. Your fingers should not touch the chest. With arms straight, lean forward until your shoulders are above the person's breastbone.



Begin chest compressions at a rate of 15 compressions to 2 breaths.

Press the breastbone downwards abut 4-5 cm (for an adult). With your hands in place, lean back and let the breastbone rise to its original position.

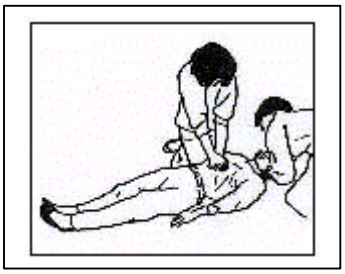
Continue pressing at the rate of about 3 times every 2 seconds (i.e. 80-100 times a minute).

Give mouth-to-mouth breathing at the rate of 2 strong breaths into his mouth after every 15 compressions.

Recheck the pulse at that neck after one minute, and then every 3 minutes. Feel the pulse by placing your finger tips on the voice box and sliding them down into the hollow between the voice box and the underlying muscle. Stop chest compression when the pulse returns. Continue until help arrives, or until you feel too tired to continue.

Two Operators

First Operator: maintains the open airway, gives mouth-to-mouth breathing and checks the pulse at the neck.



Second Operator: does the chest compression.

If CPR needs to be continued for a long period, the operators may change places.

The first operator kneels at the person's head. The other kneels on the opposite side of the person at the level of the chest.

The first operator opens the airway by tilting the head back, then gives two strong breaths and checks for a pulse in the neck. If the pulse is not present, the second operator will begin chest compression.

The first operator (at the head) keeps the airway open and gives a single breath after every 5 chest compression by the second operator. Check the pulse at the neck after the first minute and then every 3 minutes. Stop compression when the pulse is felt.

Emergency Guidelines For Performing Child CPR

Would you know what to do in the unthinkable event that a child stopped breathing? Such emergencies while rare, do sometimes occur, typically as a result of choking, electrical shock, drowning, or an allergic reaction. Cardiac arrest in infants and young children is usually the result of lack of oxygen caused by respiratory difficulty or arrest. Injuries and poisoning account for more that 8,000 fatalities in children under age 15 every year. Nearly half of all injuries involve vehicle accidents, and about 20% involve burns, firearms, and poisoning. This is also the reason why any parent or caregiver to children should become familiar with the lifesaving CPR skills.

One-Rescuer CPR: Child (1 to 8 years)

CPR performed on young children is similar to CPR for adults and older children except for four differences:

- If the rescuer has no help, give about 1 minute of CPR before activating EMS system.
- Use the heel of one hand in chest compressions rather than both hands.
- Depress the sternum one third to one half the depth of the chest (about 1 to 1 ½ inches).
- Provide 100 compressions per minute, giving 1 rescue breath for every 5 chest compressions.

Airway

Assessment: Determine unresponsiveness. Tap or gently shake shoulder and shout “Are you OK?” If no response call out “Help!” Position the victim on his or her back, taking care to support the head and neck in case of injury. Open the airway, using head tilt-chin lift.

Breathing

Assessment: Determine breathlessness. With your ear over the child’s mouth, look at the chest and look, listen, and feel for breath while keeping the airway open. If the victim is not breathing, give 2 rescue breaths, mouth to mouth (1 to 1 ½ seconds per breath). The chest should rise with each breath, then fall.

Circulation

Assessment: Determine pulselessness. Using two or three fingers, feel for the carotid pulse (side of the neck) with one hand while maintaining head tilt with the other. (Do this for approximately 5 seconds). If no pulse, begin chest compressions. Find proper hand position as in adults. Compress the sternum approximately one third to one half the depth of the chest (this will be approximately 1 to 1 ½ inches, although these measurements are not precise). Use only the heel of one hand. Compress the chest 100 times per minute, giving 1 rescue breath for every 5 compressions. Do 20 cycles of compressions and rescue breaths. Call the EMS system (call 911). Check pulse. If no pulse returns, check for spontaneous breathing. If there is no breathing, give 1 rescue breath every 3 seconds (20 rescue breaths per minute) and monitor the pulse. If the victim is breathing, place in the recovery position (on the victims side), maintain an open airway, and monitor breathing and pulse until EMS arrives. Remember to stay calm.

Summary

In **Lesson 5** you learned the basic principles and procedures used in administering CPR

A detailed outline of Lesson 5 summarizes each area that you learned as follows:

A) Introduction

B) Purpose

1) Objectives

2) Outcomes

3) Quiz

C) For ALL Emergencies

1) Airway

2) Breathing

3) Circulation

D) Airway Obstructions

1) Unconscious Patients

2) Conscious Patients

E) Rescue Breathing

F) Treatment Of Shock

G) Seizures

H) Chest Pain/Heart Attack

I) How CPR Saves Lives

J) Training

K) Emergency Guidelines For Performing Adult CPR

1) Safety

2) Precautions

3) Consciousness

4) 911

5) Open Airway

6) Breathing

7) Ventilation

8) Pulse

9) Chest Compression

L) Emergency Guidelines For Performing Child CPR

Lesson 5 Test – CPR

1. **Cardio Pulmonary Resuscitation (CPR) is used to revive victims of?**

   a) Cardiac arrest.

   b) Drowning.

   c) Drug Overdose.

   d) All of the above.

2. **For ALL emergencies, you should quickly assess the patient to find out if …?**

   a) The airway is open or blocked.

   b) The patient is breathing.

   c) The patient is unconscious.

   d) All of the above.

3. **For obstruction of the airway, which statement is CORRECT for an unconscious victim?**

   a) The head should be immediately titled back in order to see if the victim has a traumatic injury such as a head injury in an auto accident.

   b) If the victim doesn't have a head injury, place two fingers under each side of their jaw and gently push the jaw straight up and out, with the patient laying on their back.

   c) Immediately perform the Rescue Breathing technique to see if you can get any air into their lungs with two rapid breaths.

   d) Open the mouth and move your fingers around to see if you can grab any object that has been stuck in their throat.

4. **What does "mouth-to-mouth" mean?**

   a) The technique used to attach a protective device to your mouth and that of the victim

   b) The technique used to check the airway, breathing and circulation.

   c) A simple, quick technique that assists a victim to regain their own breathing.

   d) A firm vacuum between the lips of the victim and the first responder to create suction.

5. What is the definition of "shock"?

a) Blood loss.

b) Failure of the heart to pump properly.

c) An extreme allergic reaction.

d) Inadequate tissue perfusion.

6. If someone is having a seizure, what statement below indicates the proper thing to do?

a) Restrain or stop the victim by performing the Heimlich Maneuver.

b) Protect the victim during the seizure by removing any obstacles or objects they could be injured from.

c) Place a ruler, book or other object into their mouth so they don't swallow their tongue.

d) Lay the victim on their back and immediately begin rescue breathing so they do not become unconscious.

7. What is <u>NOT</u> a symptom of chest pain related to a heart attack?

a) Tightness/pressure in the center of the chest.

b) Sweaty, clammy skin.

c) Indigestion, bloating of the stomach and feeling faint.

d) Numbness in one or both shoulders or pain radiating down either or both arms

8. CPR is a combination of mouth-to-mouth resuscitation and chest compression. Which statement below in <u>NOT</u> correct?

a) Mouth-to-mouth helps get air into the victim's lungs.

b) Chest compression forces oxygen-rich blood to the brain.

c) The brain can be irreversibly damaged from lack of oxygen.

d) Rescue breathing forces adequate blood supplies to the brain.

9. What group below is <u>NOT</u> considered to be "high-risk" for cardiac arrest or respiratory failure?

a) Those with personal or family history of heart attacks.

b) Those that are not physically able to administer CPR.

c) Those with angina or high blood pressure.

d) Those that are overweight.

10. **Which is the MOST IMPORTANT step in administering CPR?**

a) Open the Airway.

b) Look, listen and feel for Breathing.

c) Check for pulse and Circulation.

d) All of the above.

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